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R.H. THE DUKE OF KENT, K.G., K.T., G.C.M.G., G.C.V.O.

HONORARY PRESIDENT, 1942

WITHIN a few months of the death of H.R.H. the Duke of Connaught the Royal Geographical Society has to deplore the loss of his successor as Honorary President, H.R.H. the Duke of Kent. We had hoped that when the Duke of Kent graciously consented to succeed the Duke of Connaught we had an Honorary President on whose support and help we could count for many years to come. But this was not to be, and a tragic accident has robbed us of one who was in every way a President of whom the Society was justifiably proud. As it is we can only regret our heavy loss, a loss which we share with the whole British people, for in his short life the Duke of Kent had shown that he possessed in full measure those great qualities which not only fitted him for his high position in public life, but which endeared him to the hearts of his countrymen. Let us take what consolation we can from the thought that he died, as he had lived, in the service of the country he loved.

GEORGE R. CLERK, *President*.

Cecil Beaton

THE SURVEY OF SARAWAK

CAPTAIN D. L. LEACH, R.E.

Meeting of the Society, 9 March 1942

SARAWAK has an area of about 50,000 square miles with a coastline 450 miles. There are many rivers, some navigable in their lower reache large areas of coastal plain and swamp, a broken interior rising to hi forested mountains on the boundary. There are no arterial roads or railwa and therefore the areas of close settlement are found around the lower reach of the larger rivers. Isolated patches of native permanent cultivation exte from the closely settled areas into the interior. The map shows the locati of the principal rubber, sago, and pepper plantation areas as well as the di tricts from which come the natural products of the country. The populati is about half a million, of whom one hundred thousand are Chinese, t remainder Malay and pagan races, and there were some three hundred a ninety Europeans including the staff of the oilfields.

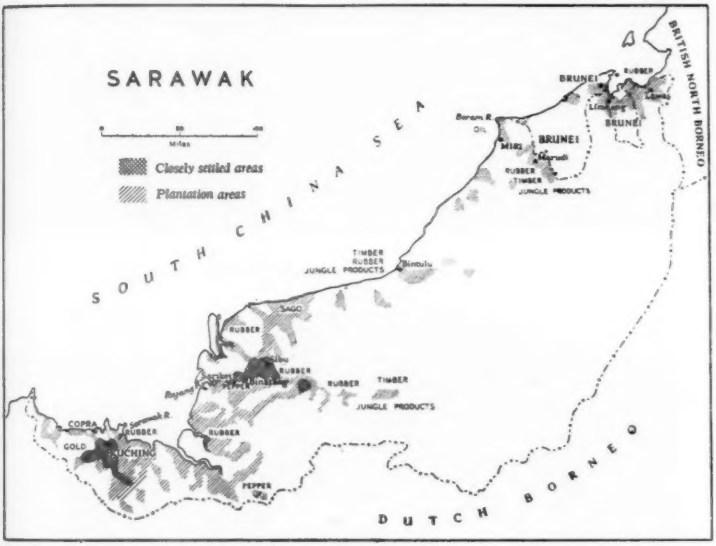
Before 1920 there were only topographical sketches, mostly of rivers, ma by the late Dr. Charles Hose and others; rough isolated surveys of vario cultivations; and sometimes small parcels of land alienated for short ter were described by rough measurements made by the local clerk or policem The nearest approach to a title survey was that made when land was grant for a long term of years. Fairly accurate measurements of boundaries we then made and described in a diagram on the back of the grant, of whi some thousands were issued. As these older boundaries were generally fai well looked after and the issue of grants kept pace more or less with t demand for land, the adjoining descriptions fitted together more or l over closely settled areas, but there was no survey control or cadast system.

The years 1920–25 saw the beginning of a demand for land in small parc that was to increase rapidly. They saw also the beginning of survey w limited funds and means, sound enough in elementary principles, but suffe ing from the lack of a long-term plan and standard policy. Accuracy varied the same class of work and none of the minor triangulations or traverse cont could be adapted to extensions. Topographical surveys during this time we traverses of some of the main rivers by subtense or compass and range-find and a coastal traverse of perhaps the same accuracy. The only control was isolated astronomical fixes. This was useful for scales up to 1/150,000 but n for larger scales. By 1925 the survey had failed to keep pace with the alie tion of land in small lots, and with the rubber boom in full swing, the situati was rapidly becoming chaotic. The Survey Department was then separa from the Land Department and placed under the direction of Mr. N. Middlemas from the Federated Malay States. Plans were made for a triang lation of first or at least good secondary standard; for a subsidiary triangul tion dependent on this, with hill sketching for maps on 1 inch to the mi standard traverses to take the place of tertiary triangulation; theodol control traverses round blocks of land parcels; and compass and chain surv

of individual lots, to form the basis of title. It was intended that all these should be carried on together so far as finance and staff allowed. But much "cart before the horse" work had to be done, which, as all surveyors know, is more expensive in the long run.

The scales were to be a mile to the inch for the cadastral and topographical maps covering 25 miles square, and 16 chains and 4 chains to the inch for cadastral maps, making respectively twenty-five and four hundred sheets for each of the inch maps. Town plans on the scale of one chain to the inch were all theodolite surveys.

As far as resources permitted, theodolite control traverses were run round blocks of lots enclosing from 50 to 200 acres. At this time there was a great shortage of unskilled labour owing to the boom in rubber, which reached its



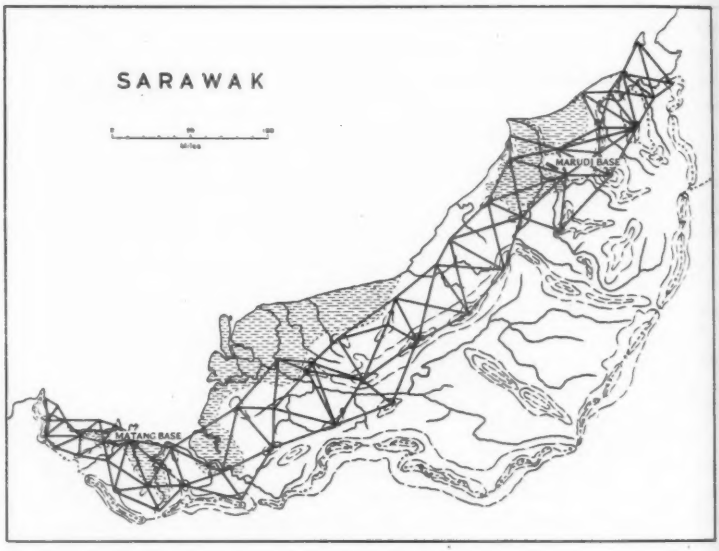
height in 1926. A coolie could earn far more in a few days tapping rubber than the Survey could pay a skilled demarcator for a week. By 1930 the labour position had become much easier.

In order that the control traverses should fit into the projected triangulation and standard traverse network, they were orientated by basing the work on a local astronomical point and thus keeping the bearings to the meridian of reference. The coordinate positions of a block were of course only approximate.

By 1931 the triangulation was planned and the first base line was measured at Matang near Kuching in August of that year. Sarawak does not offer much ground for good base measurement. The coastal plain is more swamp than hard ground and the undulating country within has too many abrupt slopes and ravines. The major part of the Matang base was on an embankment

road built over the swamp, to carry the Kuching water supply. The ground was fairly good over the greater part of its 7 miles. One end was near sea-level while the other had to run steeply up to 300 feet on a mountain side. Base extension was difficult. The measurements were made as usual with 100-feet invar tapes in catenary on moveable tripods, and corrections for slope obtained by levelling between tripod heads, with corrections for deformation of the catenary on the steep approach to the western terminal, of which the worst part was measured by a long steel tape one-sixteenth of an inch wide, weighing only 1 lb. for 330 feet. All field tapes were standardized daily in catenary at a testing station in Kuching. Wind was no trouble as vegetation afforded good shelter.

Before the reconnaissance of the main triangulation could be begun, some



of the more domestic problems had to be settled. In Sarawak communications have naturally grown up to meet the needs of local inhabitants. The numerous rivers are the highway of trading, and communications between one river system and another are poor. Native paths and tracks, often precipitous, and always muddy and slippery in the wet season, vary from a made pathway 3 or 4 feet wide to an apology for a track that tried one's temper when the weather was bad and the journey long. Once away from these inter-village tracks, one sometimes uses tracks made by pigs and very often cuts one's own way, which is not as tedious as it sounds in the "old jungle," as they call the forest which covers a great part of the country, but is to be avoided in secondary growth of only a few years. The older secondary growth is not so bad. One unloaded coolie leading can with judicious use of his *parang* keep the party in fair progress except in actual swamp. Here one

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Phot. Wearnes Air Service

Kuching looking down-river, north-east

Phot. Wearnes Air Service

Kuching looking west

Oilfield: Sarawak

Lutong oil refinery

Phot. D.L

Kapit, government station, Upper Rajang river

may take advantage of pathways made by felling trees, so that a more or less continuous line of trunks does duty as a road. There is seldom any handrail, and a slip means a nasty fall among the roots and spikes into the mud and slime of a swamp forest. Travelling by river may vary in one day from a pleasant trip in a comfortable motor launch to a precarious existence in a narrow dug-out canoe, where a sense of balance and the ability to sit in one position for hours is the secret of long life.

So, much thought had to be given to the outfit required to maintain a European officer and native party for long spells in the field in these conditions, and to enable him to move quickly when everything had to be carried in baskets on the backs of porters over steep country. Except for instruments, equipment had to be made from local resources. Fortunately, the early work on the base line was near Kuching, and the equipment was designed by trial and error.

For spending nights away from villages most travellers in Sarawak rely on temporary shelters made from *kajangs*, light mats of the nipah palm leaf, but they do not stand much moving and re-erection. For a long stay comfortable houses can be built with *kajangs* and jungle poles. A weather-proof bark hut needs no transport but takes long to build. Temporary shelters can be made from light poles and various kinds of palm leaf, but one's comfort depends greatly on the locality. A tent seemed to be the answer, but all those made by professionals were far too heavy and cumbrous, especially after a wet night, so a tent of ridge-pole type, 8 feet by 6, was made to measure by the local Chinese tailor from 6-oz. khaki drill reinforced at the corners, which gave excellent service in all weathers, tropical downpours and blazing heat. No poles were carried. For clothes, bedding, and books, containers of tinned steel or zinc were made in convenient sizes for pack-loads, with a deep close-fitting lid, not too big to be placed conveniently upright in small boats. Camp beds, sometimes carried when river transport was used, were useful when spending the night in a house with a wooden floor, but otherwise an unnecessary luxury. Jungle kit was a canvas ground-sheet, a thick blanket for mattress, a small pillow, and a couple of light blankets bought in the bazaar for a Singapore dollar or so each.

Rice is the staple food of the country, with fern tops and fish caught with the *jala-jala* net, pig, deer, and wild pigeons, with occasional chicken and eggs from villages. Some European foods were carried. All loads had to be adapted for packing in the native carrying basket, the *slabit*, with a basket-work or wooden panel to fit the back and shoulder, and head straps made from the tough inner bark of a tree.

Reconnaissance for triangulation was in general difficult. All hills are covered in heavy forest, and it is useless to fell much unless sure that the point is wanted. The most successful plan, if little was known about the country, was to make a preliminary journey by the easiest route along the line of the chain and get an approximate idea of the topography by clearing lightly wooded low hills near the line of march and intersecting the higher points from these stations wherever possible. Later most of the higher points would have to be visited and the rays proved by cutting a view on the bearing of

each line. Clearing of the whole point, marking the station and erection of the beacon was carried out by a party under a native headman.

Travelling being so slow, a visit to these high points to prove rays was very much a flying trip, and only the bare minimum of stores could be carried, the remainder being left below. It is surprising how much attention has to be paid to this question of cutting down weight, and how little one really needs.

Even on reconnaissance, and certainly for observing, one had to be on the top at the crack of dawn and again for the hour or two before dark, and one's camp therefore had to be near the top. Often the water situation was acute, even in Sarawak; on one occasion all water had to be carried up over 2000 feet. One might spend all day clearing sight for the reconnaissance; then mist would come down for twenty-four hours. Climbing trees to get a view was useful only if the mountain had a high sharp peak, for nearby ridges and spurs generally carry much heavier and taller timber than the summit. These difficulties increased when dealing with hogback ridges of 500–1500 feet near the coastal plain.

Having decided on possible points, most of them were visited to prove rays. Often the highest point was located only after running clinometer or barometer traverses along a section of the ridge top. Excessive cutting to prove rays was sometimes avoided by ranging through the forest a line from the proposed trig. point to where the fall of the mountain side gave a view of the distant point. Thirty-foot flagpoles lashed into the tops of trees were sometimes useful in base net and secondary trig. reconnaissance. Preliminary heights were by barometer or better by vertical angles on 3-inch theodolite.

The information obtained during the primary reconnaissance was supplemented by visits to the area in which the secondary breakdown was required after the primary points had been fixed. This reconnaissance was a good deal easier to carry out but sometimes became complicated owing to the fact that in a country not fully developed, the ideal even distribution of a trig. net conflicted with the ruling condition that "secondary trigs. are required in or near areas of settlement." The future use of trig. points was not to be lost sight of: it was the old problem of cost and present needs against the long term and ultimately cheaper view.

Clearing and marking stations

The need for the station having been established beyond doubt, the whole hilltop was cleared of timber except on hogback ridges or in confused country with rounded hilltops. Here either a section of the forest on the ridge was cleared or wide lanes cut through. Clearings were sometimes 10–12 acres for one trig. point: all heavy, close-growing timber. Some lanes on the Marudi base net points were $\frac{1}{4}$ mile long and 60 feet wide.

On a hill such as Buri, although it had a rounded top of considerable extent, it was more economical to clear the whole as many rays met there. In this kind of general clearing the "driving" method can be used with effect. A section of forest on a slope is dealt with by only partly cutting all the trees except those at the head of the slope, which are cut and felled simultaneously against the remainder, when the whole section comes to the ground with a

Phot. Oxford Univ. Sarawak Exped. 1932

The Upper Tinjar river

Phot. Charles Hose

Dapoi river, Baram District

Phot. J. C. B.F.

Rajang river near Song

Phot. H. W. Smith.

Munga Babi, Land Dyak village near Kuching

ontinuous roar of cracking timber and crashing tree trunks. Great is the xcitement among the tree fellers when a successful drive takes place.

The selected few who start the drive having got their trees "speaking" and eady to fall, stand ready to give the few final axe blows while the uppermost an, generally the head man of the village, is ready to give the warning that rings the others scuttling to the top. As the drive begins one gets glimpses f the axe men dodging out of danger, their nearly naked brown bodies ooking very frail amongst the big timber. Once the drive is properly under ay a tremendous yelling and shouting is set up to encourage the trees to fall. Tobacco and a rest is the reward of success. When a drive sticks there are angerous moments, and if shouting at the tree is of no avail the most active an is sent in to chop at the critical point, to the accompaniment of much dvice from the bystanders. He has not much time to get out again, but we ad no serious accidents in the whole course of the survey. The labour for is work was recruited from the nearest village. Of the fifteen or so pagan ribes in Borneo the Ibans or Sea Dyaks are the most expert, as they spend a reat deal of their lives hacking down forest for fresh farming land.

While the clearing is in progress the Survey *Mandor* in charge is putting n the mark and building the beacon. A few beacons were made of angle on, and many of *belian* (ironwood) like Australian jarrah, sawn, cut, and tted before being carried to the site. In the more inaccessible spots hardwood mber cleared on the site was used. Ground marks were iron pipes 2 or inches in diameter, filled with concrete and surrounded by a block of con- rete 1 foot square and 2 feet deep, the top of the mark flush with the ground. Witness marks were 1-inch iron pipes projecting from a small concrete block.

The Wild Geodetic Theodolite was used and the observing methods suc- ssfully coped with the trouble caused by the parallel steel centres. Obser- ations were usually to opaque beacons during the first two and the last one- nd-a-half hours of daylight. Some primary observations were to lamps at ight and to helios during the latter part of the observing season, which is om October to June. The *landas*, or wet monsoon, is from the end of ctober to March, with the worst period of six weeks' rain near Christmas. he monsoon is well marked in the south-west of the country but not so in e north-east. During the *landas* visibility is excellent when the weather is ear, but there is trouble with high peaks in mist lying about 4000 feet. The st points are from 2000 to 3000 feet. After May, trouble with heat haze quires use of helios and the season closes completely for July, August, and eptember. There are no high prevailing winds, but fair breezes and some astal storms with many severe thunderstorms. Blankets, *kajangs*, and ushwood were used for weather and sun screens. Latitude and longitude ere observed with the 45° prismatic astrolabe by officers of H.M.S. *Herald* t either end of the chain. Cloud much interferes with astronomical work d there were no observations at other triangulation stations. Azimuth was termined near the two bases with observations on Polaris at altitudes about and 5° respectively. Horizontal refraction was avoided by observing from fairly high trig. point with R.O. distant 11 miles.

The sides of the primary triangulation averaged 30 miles, and of the

secondary 11 miles. The average error of closure in the first was 1·2 seconds. The geodetic calculations were made on Everest's figure of the Earth and the sheets projected on Cassini's projection with two meridians in longitude 111° and 114° E. with origin of coordinates 2° 00′ and 3° 30′ N.

In 1934, when the triangulation from the western base at Matang had reached about half way, the adjoining state of Brunei decided to invest some of its new oil revenue in a survey to be undertaken by the F.M.S. Survey Department. Cooperation was arranged, the work on the chain of triangles interrupted, and a new start made at the eastern end, stations being occupied by mutual agreement and a base of 4 miles measured at Marudi by a combined F.M.S. and Sarawak party. The triangulation common to the two states was then extended to the British North Borneo boundary and southwestwards to join up with the part of the main chain already observed, the junction being made in the middle of 1938. The probable error of the field measurement at the bases was 1/1,000,000. The length closure was 1/200,000; the azimuth, latitude, and longitude in each case 2 seconds; and the closure in height 12 feet. The western heights were based on a mean tide-level at Kuching 20 miles from the sea, and the eastern on mean sea-level from an automatic tide gauge at Miri oilfield. The simple chain of the triangulation was adjusted figure by figure with no through adjustments for latitude, longitude, and length closure.

I would like to say a word about training and preparation of observers for trig. work. There is an impression that proficiency in primary observing is something mysterious and that the trig. observer is by virtue of his occupation a much more skilled surveyor than his brothers engaged on less majestic work. In my opinion this was not true even in the days of observation with heavy and complicated instruments, and certainly is not in these times of modern light precision theodolites. An observer wants patience, capacity for taking pains, and temperament to help him face, without detriment to his work, the disappointments of weather delays and long periods of hard living and loneliness. He should have had a long training in handling a theodolite, and must respect a delicate instrument. With these qualifications it does not matter much what kind of theodolite he has used before, even though it be nothing more than a 5-inch Vernier instrument. Good eyesight for resolving minute differences of alignment in a telescope or micrometer and a light touch are the necessary physical qualifications. Having gained confidence in his new magical precision instrument such a man should be able to produce good trig. results whatever his previous experience of trig. survey. It will generally be found that the man who does good theodolite work on ordinary jobs can also do good triangulation.

Topographical surveys

Purely topographical surveys were mostly traverses of rivers whose banks are not fixed incidentally by the cadastral work. There was triangulation of wide estuaries; then traverses by subtense from side to side of the river; then by compass and rangefinder as the river narrows and the reaches are shorter; and for the head waters compass and *rotan* traverses, the rotan tape floating on

the water. These last traverses are carried right to the sources of streams, the surveyors walking in the water. Connections to trigs. when possible are made by the usual compass and chain traverse.

Panoramic sketches are made from trig. stations, writing the bearing and vertical angle against each peak and saddle, as observed with 3-inch Vernier theodolite, and plotting on 2 miles to the inch. Form lines at approximately 500 feet interval are sketched on the field plot.

In 1926 an air survey of the deltas of the Rajang and Sarawak rivers was made by the Air Survey Company, who supplied photographs, a mosaic, and a map compiled on ground control by the Sarawak Survey Department. No stereo plotting was done. Mapping of the interlaced waterways was greatly improved.

Cadastral surveys

Minor triangulation, the highest class of work done by the Asiatic surveyors, was used only for isolated fixes, all triangles being fully observed except intersected points for lighthouses. In Sarawak the place of minor triangulation is taken by standard traverses owing to the difficulties of clearing. The important very long traverses were by European surveyors, others by the Asiatic staff. Angles were taken by the Wild Universal or the 5-inch Micrometer Theodolite and distances by continuous steel band in catenary. The bands are 6 chains long, $^1/_{16}$ of an inch wide, and weigh only about $1^1/_4$ lb., so the catenary correction is very small for unsupported lengths up to 250 feet. Temperatures were measured by swinging a thermometer on the end of a string.

In control traverses with Vernier Theodolite and steel bands of $^1/_8$ of an inch wide, the angles and linear measures were carried out together. No temperatures were measured, but the bands were standardized at 85° F. and all tested regularly. Town surveys were theodolite traverses similar to standard traverse work; survey of large parcels in the country by control traverse; and small lot boundaries by compass and steel band, with vertical angles by clinometers (protractor and weighted string made up locally).

DISCUSSION

Before the paper the PRESIDENT (the Rt. Hon. Sir GEORGE CLERK) said: The paper for the meeting this afternoon is by Captain D. L. Leach, Royal Engineers, who will lecture on the Survey of Saráwak. You will notice that I gently pronounced the *k*. I have learned from Captain Leach that that is correct in Sarawak, but that in the Malay States the *k* is not pronounced.

Captain Leach is a New Zealander who passed as a cadet through the Government Survey Training in New Zealand, and when he was qualified soon obtained a position in the Survey of Sarawak. His subject is that Survey, but in the course of the paper he will show us, incidentally, many pictures of the country. I now call upon Captain Leach.

Captain Leach then read the paper printed above, and a discussion followed.

The CHAIRMAN (Mr. W. L. SCLATER): The President has had to leave. In taking his place I call upon Colonel Boulnois to say a few words.

Colonel P. K. BOULNOIS: At the beginning of this war we in the Geographical

Section of the War Office experienced difficulty in finding topographical surveyors. We were faced with the problem of expanding the survey service of the Army from nineteen officers to well over two hundred, and we searched the world for energetic young men who had had topographical survey experience. I do not mind confessing that we found remarkably few available. There were a number who had done large-scale survey of small areas but few who, like Captain Leach, had surveyed large areas such as Sarawak. They were known as the Survey Irregular Cavalry, and I remember two names, Leach and Rotheray, outposts of that Cavalry, who came back to England from Sarawak and Nigeria to help us out in the survey service of the British Army.

You have now heard from Captain Leach what the survey of a territory such as Sarawak means. From a technical point of view, the lecture was a vignette of the type of survey that these men do all over the Empire, a highly specialized type of work. Some of them work in Nigeria, some in the Gold Coast, and there were some in Malaya, but they are few and difficult to come by. Therefore I was exceedingly interested, technically, in what he had to say, and there are many questions I am going to put to him later, but with which I will not trouble you now.

Captain Leach spoke of the way in which the people in Sarawak started by not wanting a survey, by being satisfied to get their various lands mapped on a large scale quite independently, a property here and a property there: the worst kind of survey we can have. Eventually someone finds his own particular property cannot be placed on the map because there is no room for it: there has been no proper framework.

There is one point I hope Captain Leach will deal with when he replies, whether air survey was used at all in Sarawak. We heard at our last meeting of its value in connection with the Alaska Highway, in particular of survey by the aircraft belonging to the Government. That seems to me to be the crux of air survey. If Governments can be persuaded to use their own aircraft to produce air photographs from which surveys can be made, then the economics of the air survey problem will be solved. If not, air survey will not come into its own.

Captain LEACH: As to air survey, we adopted it in Sarawak for a small portion of the territory, two of the deltas of the large rivers which make up the coastal plain. That was carried out by the Air Survey Company operating from Rangoon. It did not however attempt any stereo-plotting. All it produced was a mosaic of photographs and an outline plan that helped us a great deal in the survey of the hundreds of channels and small waterways that make up the two big deltas. Beyond that there was nothing in the way of air survey in Sarawak, but it is to be hoped that in the future there will be a good deal more.

The CHAIRMAN: I am sure we have all enjoyed an interesting afternoon and that you will agree that much gratitude is due to Captain Leach for his account of the methods he adopted in difficult jungle country. You will join with me in according him a hearty vote of thanks.

SIX WEEKS IN SHABWA

MAJOR THE HON. R. A. B. HAMILTON

Meeting of the Society, 20 April 1942

At the end of his lecture, "The land of Sheba," the Seventh Asia Lecture of the Society, Mr. St. John Philby said that the solution of the many roblems he had raised was the business of expert archaeologists rather than common explorers. I agree. But the experts have not yet come forward nd are not likely to in the near future. What little is known of the history of outh Arabia has not yet been correlated. A great deal of work has been done y it by the Germans, and I hope that this work may survive the war, if the ermans do not. So, in the absence of the experts, or even of the "common xplorers," I hope that the Society will excuse the intervention, now, of such low form of life as a common Political Officer.

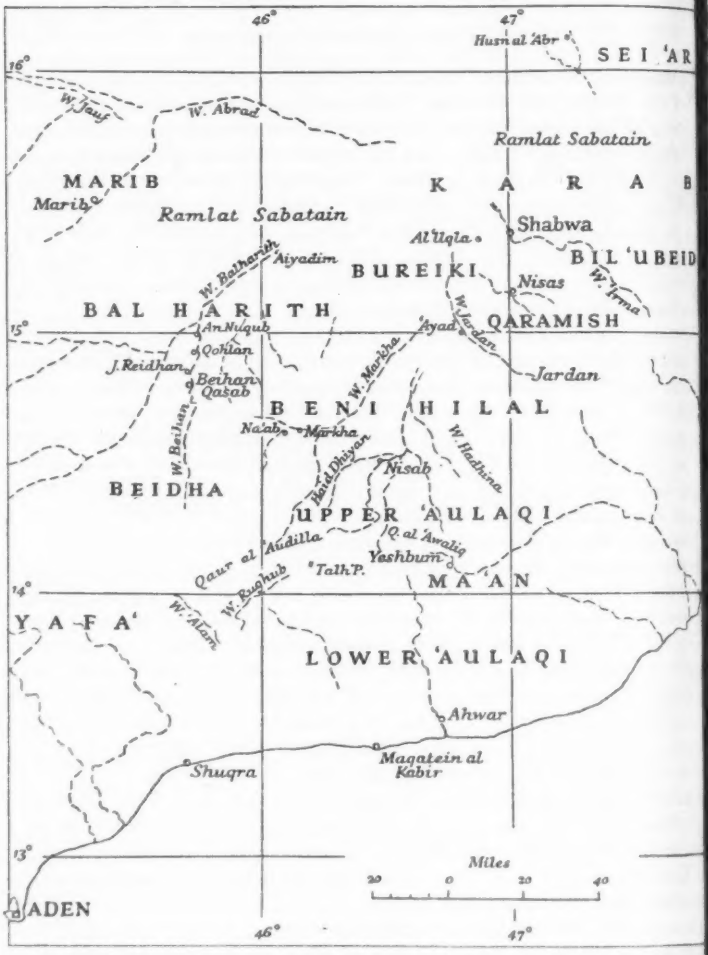
Mr. Philby's remarkable and most fruitful journey had many objects, not e least of which was to put Shabwa on the map. This Mr. Philby did, and thus ended the phase of uncertainty regarding Shabwa. We can now, xcept for the interest of discussion, leave behind us the reports of the old eographers, Pliny and Strabo, and of all those up to the time when Mr. Philby ad his first experience of the South Arabian greeting ceremony, about which shall have more to say, and then wandered across the ruin area, speculating how one could fit sixty-five temples into it, according to Pliny.

I followed Mr. Philby, after he had delivered his lecture. I had with me t only a copy of the Society's *Journal* containing his lecture and his excellent aps, but a sheaf of notes of my own dating from 1931, containing all the formation I had acquired of the country and personalities unknown to me mong the Bil 'Ubeid and the Eastern Beni Hilal. Mr. Philby's maps were owever my most precious possession. Before I go any further I must stress e point, and excuse myself for it, that I travelled as a Political Officer on uty, and the thoughts in my mind, as I recollect them to-day, were not cientific, but concerned how I should keep a mixed collection of seven arlike tribes happy in a salt-pan with salt water and little food.

I travelled, on a hastily arranged programme, from Beihan in the winter of 38. We followed the course of the Wadi Balharith, the continuation of the adi Beihan, in company with about two hundred and fifty of the Bal Harith d Karab tribe. The latter are a tribe of the Bil 'Ubeid confederation, who n a large part of Shabwa itself and range to the north with the Sei'ar and the south with the Beni Hilal. The Bal Harith are an independent tribe who here to the sharifs of Beihan. Many of them are intermarried with the rab as are the sharifs.

We passed about 5 miles south of the rock-salt outcrop of 'Aiyadim, which longs to the Bal Harith. The country here is sand-dune country. The tcrop is prolific of salt and the rock is oil bearing, part of the oil rift which ns from Marib to Shabwa. Oil collected at 'Aiyadim can be, and is, burnt native lamps. From here the country becomes level gravel plain. We

marched direct on Shabwa and entered the Shabwa area at Al 'Uqla, wh
I was joined by the Hammami Sheikh, the Shemlani Hammamis, and so
Suleimani 'Aulaqis of the Ma'an tribe. I shall be describing the pecu
organization of these tribes later, to illustrate certain conclusions I have form



Even to-day, some thirteen centuries since the probable date of its destr
tion, the name of Shabwa is almost revered in Yemen and Hadhramaut.
has been romantically called The Hidden City of Arabia. Ancient geograph
were told of its glories, of its sixty-five temples. It has been called the anci
capital of the Himyarites. Arab rulers who have never seen it, and wh
lands are divided from it by deserts, are jealous of its ownership. Tribes

h one another to accord protection to its poor inhabitants and their flocks. plorers have adventured their lives to be the first to see it.

What is Shabwa to-day? Two small villages and a well of salt water and w acres of rarely watered ground, with a varying, semi-nomadic population raging about two hundred people. The well is almost undrinkable in the months, so salt does it become. It stands on a dome of rock-salt, almost rounded by low hills of shale and brittle, marble-like stone, full of twisted s and fissures, which the continuous movements of the salt have forced ward and broken. The salt is taken from mines difficult of access. As mines, those at Shabwa are inferior to the Bal Harith mines and to the es at 'Ayad, some 20 miles to the south of Shabwa, where the salt is re extensive and more accessible.

Shabwa is a desolate place to-day, of little importance. Those who know ant no more of it. It is watched over by the Bureiki tribe, the unwarlike rather miserable descendents of the saint buried there, whose distant genitor had the curious name of Seil al Leil, or the Night Flood. The t has little importance and that only among the Bureiki and the neigh-ring Bil 'Ubeid. Few caravans stop at Shabwa, other than those which the salt to the Hadhramaut. A few gifts come to the saints' tombs and bwa has nothing, not even fodder for sale, except the salt, most of which ngs to the Karab tribe and not to the Bureiki, who are nomads of the rest sort.

would describe Shabwa to-day as a desert well rather than an oasis. It not even the attraction of being an indispensable desert well; there is r water in the wadi at Nisas, some 10 miles south of it, and grazing and r in 'Irma and Jardan, the rich settlements to the south-east. If Shabwa ppeared to-morrow, the lives of the desert men would be affected very , and of the settled men not at all. It has a political importance, because e number of tribes bound to protect it and the caravans which pass north south of it. But I think we can fairly say that, as a modern settlement, it very little importance indeed in any way.

What of its ruin? Mr. Philby found it disappointingly small. He, and all s, had been led to expect something very out of the ordinary in ruins. In t and subsequently I had seen, in passing, the great ruins of Markha, and s well acquainted with that of Qohlan in the Wadi Beihan. These sites greater in size and, on the surface, far more interesting. From these sites from sites near Marib had come, so unfortunately, the flood of memorial es and fragments of inscriptions which sold for a good price in Aden in t years and from which Mr. Kaiky Munkerjee, an Aden merchant, ed his collection. Shabwa is small in comparison. Its main temple—I ss I do not like Mr. Philby's name of The Temple of Astarte and ld prefer to call it The Main Temple, for so it is—was imposing enough setting, but there is hardly room for more than two priests to pass with ty abreast through the space between the two central pillars. There is inly not room for sixty-five such temples, small though it is, on the site. e should not, I think, for that reason say that Shabwa is not the famous wa. It is very unlikely that "Sabota" refers to the whole plain of the ein, for it is very unlikely that it was ever other than the desert it is

to-day. We do not after all know what Southern Arabian word "Temp
was originally. It may have meant sacred place or places of worship
sacrifice or even Mausolea, and there is plenty of room for sixty-five s
places.

If the ruin is small, whence came its great reputation? Mr. Philby
discussed and suggested some reasons for the fall of the ancient Arab
kingdoms. Let us look at the reasons for their rise, for it is in those that
shall find the reasons for their fall. We know that a great trade route led
the Hejaz from the earliest times, certainly from about 3000 B.C. In l
times, in the first century B.C., we hear of single caravans of two and th
thousand camels arriving in the southern Mediterranean area, and it is infer
that such caravans were common. A caravan of three thousand camels wo
be about 20 miles long on the line of march. It would present big proble
of watering and feeding. It would need big assembly points and stati
If we wish to find where such a route led in South Arabia, we should l
for ruins of considerable size.

Let us look at the map for the easiest and quickest route. We must s
at the southern dhow ports, which lie along the south coast at the foot of
coastal hills. In the west there is the great mass of the Yemen mountai
On the easiest of roads, these mountains present no mean obstacles to l
dened camels. Any one who has travelled with a caravan of fifty lig
burdened camels up, say, the main pass of the coastal hills east of A
would at once see that the difficulties encountered will limit the size
caravans. The old camel road from Aden to Ta'iz is hard enough going
heavily burdened beasts. Beyond Ta'iz precipice rises on precipice to
central Yemen plateau.

To the east the main Yemen range throws out a long spur of granite h
From the Beidha plateau, this spur becomes first the Qaur al 'Audhilla
then the Qaur al 'Awaliq, from the names of the tribal confederations wh
live there. Up this spur there are only three routes upon which animals
travel. They are typical of all hill routes in the country, steep and ro
They are the steep routes of the 'Alam, the Wadi Rughub, and the Talh p
The 'Alam route leads to the plateau. The other two routes lead to the N
plain. Beyond this to the east, until Seihut is reached, all routes lead to
Nisab Plain.

This plain forms part of an extremely important area, which for purp
of clarity I shall call the Nisab triangle. It is not a perfect triangle and
borders are Shabwa, Nisab, Markha, and Beihan. Travellers with he
burdened camels from Perim to Bir 'Ali going to Marib and Najran and
to the north, whatever part of the coast they start from, are forced by the
formation of the country into this triangle. Those from the south-eas
ports will find the desert on their right hand and will be forced into
triangle. Only lightly loaded small caravans will take the northern rou
Husn al 'Abr, as such caravans do to-day. The easier routes, and those th
fore preferable to trading caravans, will go slightly to the south and
eventually reach this triangle. It is my contention that there was no
port for trade from the east and the far east, but that all the dhow ports
to-day were in use in ancient times. Even had there been a main port or

or three main ports, the choice for travellers to the Mediterranean was between the Persian Gulf route and the Hejaz route. All travellers on the latter route, at whatever port they disembarked, were forced by the desert and the shape of the hills into this small triangle, the Nisab–Markha–Beihan triangle.

This small triangle must, in the hey-day of South Arabian prosperity, have been of very great importance. It is the first place where all the trade routes from the southern ports join. It is, I consider, the obvious place where we should look, geographically, for the southern terminus of the great incense route, and I contend that it was so. I do not think it is useful to hunt for mythical trans-desert routes. Camel caravans bearing merchandise are cumbrous things. They prefer the long, easy way round to the difficult short cut, and a comfortable place to rest where you pay your road dues and sleep without anxiety. It is here that the archaeologist who wishes to unravel the ancient history of the incense route may well begin; nor will he be disappointed.

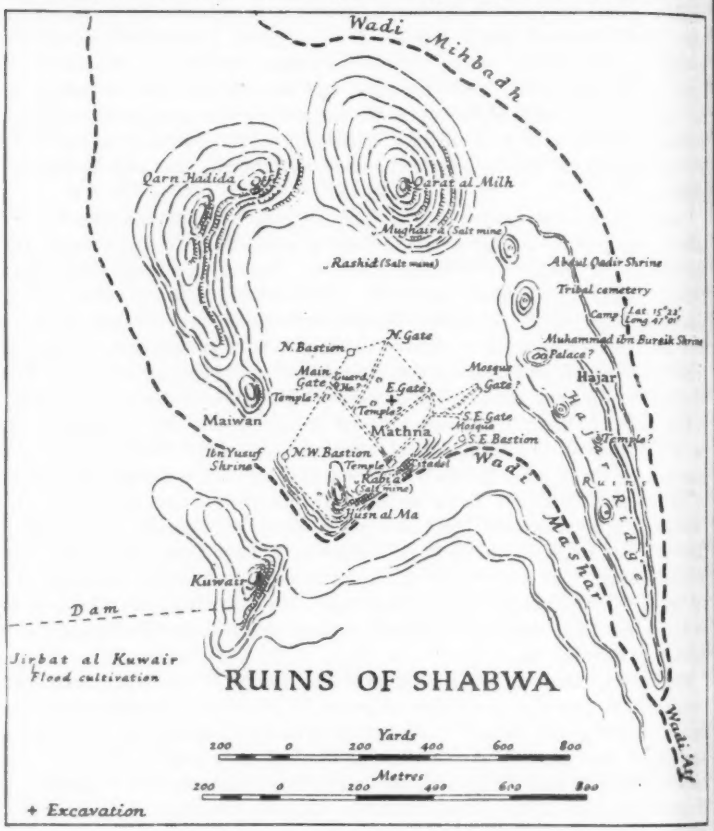
I have, from time to time, become fairly familiar with this triangle. It contains a number of extensive archaeological sites. There is the ruin of the walled city of Na'ab in Markha. There are extensive ruins in the Haid Dhiyan, many of which, as one would expect, are of aqueducts, which reach almost to Nisab itself. The Wadi Beihan from Qasab to An Nuqub is lined with archaeological remains. Above Qasab is the mountain watch-tower of Jebel Reidhan, which I climbed with Squadron-Leader Rickards in 1931. The watchmen's huts and the remains of a water cistern are on the rocky shoulder of the hill. The path to the summit goes through a corridor of plaster built on to the side of the hill, without which access to the summit would be impossible. From Jebel Reidhan to the north there is the ruin of a small dam at Al Qernein. Between there and Nuqub lies the ruined town of Hajar. Beyond Nuqub stands the great ruin of Qohlan, a walled city of importance. Here are the ruins of houses standing out of the sand, and tall beautifully written stelae. The main body of the town is deeply covered, although the robbery of graves outside it has been, regrettably, on a considerable scale in recent years. But there are several seasons of hard archaeological work waiting to be done there.

Mr. Stewart Perowne copied a long inscription there which has since been translated. It recorded a number of names of places and districts, and these names are still in use to-day. It is of great interest in considering Mr. Philby's suggestion that Shabwa is not the real Shabwa to remember this. If such names as Beihan and 'Amd, recorded in this inscription, have not changed, it is not likely that such a famous name as Shabwa has changed. It is only a small point, but interesting for all that.

The archaeological field on its surface bears out the geographical conclusion that this district, where the eastern foothills of the Yemen mountains and their eastern spur form the Nisab triangle, was of considerable importance as the southern terminus of the main trade route.

My interest in this area had been aroused in 1931, when Rickards and I accompanied Colonel Lake to Beihan, and when I returned with Lake, through Markha and Nisab to Yeshbum. But I was even then puzzled by Shabwa. I imagined it, as I suppose most people who had heard tell of it did,

as the ruin of the capital of the Himyarites. I imagined a vast ruin, with sixty-five full-sized temples, but I could not imagine what it was doing where it was. It was too far north of the main routes into the Nisab area. It was too far away from the well-watered foothills of the Yemen range. I was not, and never had been, enamoured of the theory that the climate had radically changed in the past three thousand years. Indeed the works I had seen in the Haid Dhiyan were works erected by men desperately anxious to preserve as



much water as possible in a thirsty land. People do not cut gutters in the sides of hills to trap the water before it reaches the wadis in a country where it frequently rains. I am aware of the fact that Mr. Philby brought back a sample of siltstone which might be held to prove a climate more mild than the present one. But Mr. P. M. Game, who examined it, stated that its conformation could also be produced by a monsoonal climate, and the climate of South Arabia is monsoonal to-day and was so in the first century B.C. We have moreover Strabo's description of Aelius Gallus' march into the country

south of Najran, and it is a very fair description of the country to-day. The sand may have encroached on to the plain from the north, but one would expect the Himyarites to site their capital in a place such as Marib, where water was easier to get and to which the trading caravans naturally came. As a capital city, Shabwa is in the wrong place.

I cannot, even after six weeks' stay, add much to Mr. Philby's excellent description of the ruin of Shabwa, and nothing to his map (p. 112). There are certain things, however, which struck me at once. Shabwa is surrounded, except on the west, by low hills, the results of the strata being tilted up by the rock salt. The ruin is built on the rock salt, and the salt has shifted little if at all since the lower courses were built. But the hills have no defences. Had Shabwa been an important city, such as was Qohlan, the hills which are so low and close to it would have borne defences of some kind. This led me to examine the wall. On the north side the wall is massive, and that is the side where the hills are closest and make the wall of no account as a defensive work. On the west side the wall is castellated, but the castellations are too small for a defensive work. This side is open and, in a city, one would expect a strong defensive perimeter, yet the wall is obviously ornamental. Moreover the dam, which lies across the wadi from Husn al Ma, held the water back above the town and thus can never have formed a moat for it. Again on the eastern side the wall is ornamental.

I was therefore forced to the conclusion that in the wall we have no defensive work, but an ornamental perimeter, in which the builders have obtained an architectural balance, by building the north side of massive stone to counterbalance the bluff on the south side. That the west wall was never much higher than it is to-day is clearly shown by an inscription still standing in it. It faces outwards and forms one of the upper course of beautifully cut stones at present standing and is obviously intended to be read by passers-by outside the wall. It is now about 4 feet above the wadi level, and is in 3-inch lettering. I came to the conclusion that this wall was not a defensive work, but is the boundary of a Haram or sacred enclosure, and that through this I had perhaps stumbled upon the reason for the fame of Shabwa: that it was perhaps a fame built not upon size or number of inhabitants but on its holiness.

The pilgrim entering Shabwa was obviously intended to do so through the imposing northern gate. From here he looked up a narrow street between massive buildings to the stairway which led steeply up to the main temple. Four pillars, of about 3 feet diameter, formed the temple front, and to either side of these pillars were stone plinths supporting statues. They appear, from the grooves cut in the plinth still in place, to have been animal statues, and I suspect they may well have been of the sacred ibex, which is such a familiar motif in ancient South Arabian decoration. One plinth has fallen, or been thrown down the steps and lies half buried below them. The temple is small, but the scene from the north gate will have been imposing enough. But as soon as I looked at the buildings on either side of the gate I was struck by a curious fact: they have neither doors nor windows. The construction of their outer walls is visible where in places they have suffered damage. It was strange to find, in such a poorly defended place, such massively con-

structed buildings. Their outer walls, of beautifully faced stone, are backed by a thick filling of plaster packed with heavy rubble. They would stand well against modern light field artillery, whereas the western wall would hardly need breaching. A careful inspection of those buildings, still in a fair state of preservation, showed that all were similar in these respects: they were faced, of step-pyramid shape, massively constructed, and with no doors and no windows.

On the top of several of these buildings the plan of walls is visible and all are similar. A straight passage, orientated to the main temple road, runs down their centre and is flanked to east and west by small chambers, usually some six or seven on each side. These chambers are too small for living rooms. Those open I noticed had no visible connection with each other. None had any access to the air, but are blocked from it by the massive walls of plastered rubble and faced stone.

These buildings are not dwellings. The absence of doors showed them not to be store houses, to which some means of access would be required and which would not need to be so carefully and expensively divided, and I was forced to the conclusion that they were not houses of the living but of the dead.

Similar buildings to these lie outside the wall and I believe that, at the time Shabwa was abandoned, it had already outgrown its Haram. This conclusion was further borne out by evidence of internal overcrowding. In particular, in the area close to the main temple, where the outsides of the walls have fallen away, the chambers are visible, built closely one above the other. Also between each of the buildings run the lines of walls, and slight investigation shows that these, too, are the walls of chambers similar in size to those visible on top of the buildings. So that there is evidence that, when the main step-pyramid was full, further chambers were built outside it, between it and the next pyramid, until the whole area was one large burial ground, of graves superimposed upon each other.

It remained to prove my conclusions by excavation, and it is here that I beg the experts to pardon me. I knew the risks I ran in disturbing ancient evidence, but I felt that here was an opportunity at least of coming closer to the meaning of Shabwa and of drawing attention to Southern Arabian archaeology, so long sadly neglected in favour of more accessible fields. I knew what I wanted to find out, and it was little enough. I wanted the rough date of the surface of the more recent buildings and the answer to four questions. Were the buildings mausolea? What type was the burial in them? Did the buildings stand on the rock salt? And what would an expert archaeologist expect to find, in the light of my examination?

Chance had placed me in the position of being able to excavate among friendly people, who, like me, had nothing else to do. Other travellers had not had these advantages. It would moreover be difficult, unless I could produce concrete evidence, to induce any archaeologist to set out for such an inaccessible place as Shabwa, particularly when the acknowledged expert Mr. Philby, had thrown doubt upon whether this Shabwa was the Shabwa at all.

I could, of course, have selected a badly damaged site, one to which I could do no possible harm. But this would, in all probability, not provide the

Site of excavation

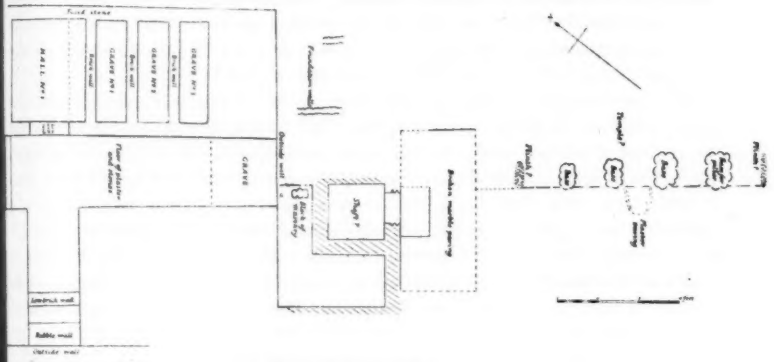
Foundation of pillar, Temple?

1. Place where step fell when plaster was broken; 2. Thin plaster
3. Window into Hall No. 1

1. Grave No. 2; 2. Grave No. 1; 3. Steps; 4. Hall No. 1; 5. Outer
6. Inscription found

evidence I sought. After a long examination of the surface, I selected a site, not on the main temple road but on a tributary road, close to the point marked "Temple?" in Mr. Philby's map (marked + on map). This building appeared sufficiently damaged to half excuse amateur meddling, but sufficiently preserved to provide the answers to my questions and to warrant extreme care in the excavation. Accordingly I wirelessed to Aden for permission to excavate, and the Acting Governor very sportingly agreed.

The excavation disclosed no wonders, but its objects were achieved, although the site was a good deal more damaged than it at first appeared to be. I am assured that the surface date is determinable and is approximately the second or third century A.D. There is no doubt that the chambers were graves. The burial seems to have been in rough earthenware urns, although a good deal more work must be done before we are sure of that, since no untouched burial was found. The graves are filled with packed earth of fine texture and, without this filling the mausolea would not have remained stand-



Plan of excavation

ing. The graves are superimposed one above the other, a thin flooring of plaster only dividing them.

The excavation was begun at the northern side of the mound and disclosed a small flight of heavy stone steps. The fifth and last step, one-third broader than the others, rested on a thin plaster flooring under which was packed earth, which supported the steps. This flooring was that of a passage running the length of the building to the south, and branching at the fifth step into another passage to the east. The west wall of the central passage communicated with a larger chamber, in which were found considerable quantities of plaster moulding of grape-vine pattern. Two graves and a possible third were excavated south of this hall. In one the floor was found and left intact. I would like to have opened it, but felt the eyes of distant experts upon me.

Plans and depth scales were carefully drawn as the excavation proceeded. Samples of various kinds were collected, so that an expert can make a general examination of the whole excavation, and the samples and plans are safe in this country. They await expert examination. They were shipped home

shortly before the outbreak of war and subsequent events have prevented me from seeking out the proper authorities.

The excavation continued over the site marked "Temple?". Here a plaster paving, once painted, was found between the central pair of the four small columns and thus ancient ground level was discovered. In the north foreground of this small temple were a marble floor and a door leading into the foundations of the building. This was followed down about 18 feet below ground level, where the main foundations of the building were found to rest on the rock salt. The courses resting on the salt showed no signs of disturbance due to earth movements. It was clear that this door, some of the burnt wood of which was still in place, gave access to the foundations of the building and was, no doubt, used for some ceremonial purpose.

I think it safe at this stage to sum up the building excavated as follows: It is a mausoleum, with the dead buried in or with earthenware urns in small chambers, packed with earth and superimposed one on another. A central passage and another passage give access to the higher third of the building from steps leading from the top. There is one chamber, communicating with the passage through a window, which was not a grave at the level of the passage, but a hall used for some ceremonial purpose.

The mausoleum is built in the form of an irregular step-pyramid. Its outer walls are of plaster-packed rubble, faced with beautifully cut stone. Its lower, outer courses connect with walls running towards similar mounds in its vicinity. These walls are the upper courses of more burial chambers, and I infer from this that, when the original mausoleum became full, it was extended outwards to contain more burial chambers below ground level. It is connected with a small temple with four pillars, which stands between it and a similar mound to its south. It is divided from the similar mound to its east by a narrow passage, and there appears to have been no extension of burial chambers to connect it directly with either of these two mounds, but there is an inferred purpose in the situation and communication between the temple and the mounds, as is proved by the door found in the excavation.

I then undertook a thorough examination of other mounds and buildings inside the Haram. In all of them I found only the North Bastion dissimilar in essentials from these two, the mausoleum and the temple. The North Bastion is surmounted by a modern building and, like the rest of the Haram wall, appears to have no communication with the mounds within the Haram.

On this examination and the excavation I contend that the entire area within the Haram was a burial place. Shabwa was a holy city and not a capital city. It was either shared by successive and by different kingdoms or, more probably, was the burial ground and holy of holies of a powerful priestly caste. I suggest that the probable date of its destruction was post-Islamic, although the surface of the site excavated was earlier. So holy a place will have survived political changes, but must have ceased to have religious importance soon after the rise of Islam. I contend that the problem of fitting sixty-five temples into the area no longer exists. If each mausoleum had its little temple and its little place of sacrifice, the problem is solved. The overcrowding of the site with buildings and the mode of burial I suggest can be explained by an endeavour to keep all within the confines of the Haram

wall: an endeavour which was not successful. All the marble and stone visible could have been quarried locally.

If all the modern and the ancient arable land were under biannual crops, it would hardly support a population of over two thousand people. There is ample archaeological evidence of the care taken to preserve water. The ruined sluice gates visible to-day are beautifully made. The western wadi was then dammed below Husn al Ma and its upper courses are visible. Its lower courses await excavation. An inscription found and photographed in the wadi bed is made in similar stone to that of the west wall and perhaps came from there.

Having noted so much on the archaeology of Shabwa, perhaps I may be pardoned for expressing the hope that, after the war, the whole area may be visited by experts. Five years of hard and interesting work await them in Shabwa alone. There remain the extensive neighbouring sites of Jardan, Nisab, Markha, and Beihan. I am of the opinion, for what it is worth, that thorough excavation in this almost untouched area will show the way to the further excavation of the sites discovered farther north of it by Mr. Philby. It will throw light on a number of interesting problems, in particular those of the diffusion of culture between the Mediterranean and the Indian Ocean.

To conclude, I suggest that the ruin area, which includes Jardan, Markha, and Beihan, was the southern collecting point for caravans from the south coast and must so have been whatever political changes South Arabia experienced; that the importance and fame of Shabwa was that of the holy place of this area and as the burial ground of a powerful cult; and that its fame was enhanced by the beauty of its buildings and its comparative isolation. It is safe to say that it was not a halting place for large caravans, nor was it a seat of temporal government. It was never rich agriculturally and is only one of a number of similar areas bearing rock salt.

Mr. Philby in his lecture brought forward certain problems, and I would like to comment on these. The main problem is to find a cause for the decline of the South Arabian kingdoms. Mr. Philby suggests that they were destroyed perhaps by volcanic disturbances. There may have been volcanic disturbances then, indeed, there is a mountain in the Yemen near Jebel Masna'a which was still emitting sulphur fumes in 1904, and various hot springs all over South Arabia testify that volcanic disturbances may well take place in the future. But the trade built these kingdoms and, had the trade remained, they would have survived even the most catastrophic disturbances and, having survived, these disturbances would have been recorded in inscriptions. We have evidence in an inscription from the famous dam at Marib that Abraha, the Viceroy of Abyssinia, repaired the dam in the fifth century A.D. He left an inscription in the name of the Holy Trinity. Whatever cause led to its first collapse, if volcanic action had led to its second, which must have happened soon after its repair, one would expect some history of the catastrophe, for this is all well within the historical period of the country. I am inclined to believe that its collapse was the result and not the cause of the disintegration of social services.

Strabo reports that in his time a pound of pepper brought overland to

Rome was one hundred times more expensive than a pound brought by sea. The sequence of the monsoons was known to Roman navigators in the first century B.C. Thereafter sea trade increased until, in the hey-day of South Arabia in the third century A.D., land trade must have been most sadly reduced. No doubt the decline was gradual and no doubt the Arabs increased their dues in an effort to stabilize their finances, only to further weaken the caravans. As riches declined, so contact with the rising civilizations north and east became less, and eventually, with the abandonment of the main trade route which had raised it, the civilization of South Arabia fell.

Mr. Philby suggests that there may have been a Phoenician invasion of South Arabia. It is an interesting theory. The name Minaean certainly has a Phoenician sound! But the true word, found in the inscriptions, is Ma'an, and Ma'an is one of the oldest South Arabian kingdoms and was established long before the Phoenician alphabet and seems to have remained in one place. It seems that the earliest inscriptions in the country belong to the eighth century B.C., which leads one to suppose that the alphabet, which was a trader's alphabet, was then introduced from the north. Had this alphabet been developed in South Arabia, one would expect evidence there in plenty of its development, for it is a very advanced alphabet.

However that may be, the name of Ma'an is still in the country. It is the name of the ruling 'Aulaqis, and it will be of interest to digress shortly into the organization of these rather remarkable people. The 'Aulaqi are not a tribe but a confederation. The name itself is of fairly recent origin, and it is used to describe the confederation of small tribes which adhere, loosely or strongly, to the central core of Ma'an. There are three rulers of the confederation, the Sultan at Nisab, the Sultan at Ahwar, on the coast, and the 'Aulaqi Sheikh, who is the 'Āqil, or head-man, of Ma'an. The most important of these three men is the Sheik of Ma'an, since he controls the central tribe. The others, who must both be of Ma'ani stock, control the Upper and Lower 'Aulaqi confederations, who go by the name of Mahajir, or immigrants.

The affairs of this 'Aulaqi confederation, which affect general tribal foreign policy, are the business of these three rulers acting together and backed by their tribe of Ma'an. The confederation is bound by treaties and understandings. Most of the ancient inscriptions which I have seen translated relating to the Minaeans are in the name of the Grand Council of Ma'an, and it would seem to-day that Ma'an still has its Grand Council. There is much work here for anthropologists.

Further, the Ma'ani greeting ceremony is practised with variations, such as Mr. Philby saw in Shabwa, over a country a great deal of which has nothing now to do with Ma'an. The legal system of the whole area covering the southern Bil 'Ubeid, the Bal Harith, the Beni Hilal, the 'Aulaqi, and part of the 'Audhali is very ancient and seems to be sustained mostly by Ma'an, who claim it as very much their own. It is under the control of a number of nominated judges who are called Manaqid (singular Manqad). They are appointed by the hereditary chief Manqad, who lives in Jardan. These men, all of whom except the chief can be of any class by birth, have great power. Their judgment, once sought, is final, and supersedes all previous judgments, and is superior to judgments under the Holy Law of Islam. I asked one by

what law he judged, and he replied, "Al Haq," or the Right, and declared that he followed no one code at all. It is curious that in this same area, the Nisab triangle, with which we have been dealing, the Ma'ani greeting ceremony and the legal system are centred. It may well be that these have survived from ancient days and that Ma'an is the remnant of ancient Minaea.

Then there is the question of the Beni Hilal. I agree with Mr. Philby that this is in all probability the famous tribe of song and story. It is sturdily independent. I enlisted many in a small force I raised and found them to be excellent soldiers and easy fellows to live among. They are quick and deeply intelligent. They have no Sultanate and were in recent years overrun by the 'Aulaqi Sultan of Nisab, but only for a time. I think there is no question but that they are and have been from ancient days an independent tribe, whose importance comes from their settlement in this vital triangle, in Hadhina and Markha, right across the two most vital parts of the area.

I suggest that the tribes have moved very little in the centuries and that the descendents of the ancient and prosperous kingdoms of South Arabia still hold their lands, in which the ancient place-names are still the same. Yafa' was the name of the deity worshipped on the 'Audhali plateau, where, on the main building of the ruin of Am 'Adia, the inscription stands "Yafa' is strong" to this day. Yafa' is the name of one of the principal tribes of the Western Aden Protectorate, who still live close to their ancient deity. In the Yemen we have the names Beni Saba and Beni Himyar, while there are the Qateib or small remnant of Qatab, who, like Ma'an, form the centre of a tribal confederation. All this goes further to prove that no great volcanic disaster forced the ancients to flee into the desert and to perish there, but that the political wealth and organization of the country slowly disintegrated, leaving the great names and the great reputations behind, still fostered by the same people.

I think that is all that I have to contribute to the solution of the problems raised by Mr. Philby's intensely interesting and thorough exploration. My main thesis is an invitation to the archaeologists and another to the anthropologists. To conclude, I think that we can say that only expert examination can find satisfying answers to our problems. I think it is important that we, and not other nations, should be first in this scientific field. Mr. Philby has given the scientists a great lead, but we cannot expect him to become a scientific archaeologist now and, as it were, follow himself. He will, no doubt of it, delight in leading them to where they should go, only I hope that both he and they will listen to my very unscientific voice and try first in the Nisab triangle.

DISCUSSION

Before the paper the PRESIDENT (the Rt. Hon. Sir GEORGE CLERK) said: The reader of the paper this afternoon, Major the Hon. R. A. B. Hamilton, Master of Belhaven, has a long family connection with the Royal Geographical Society in that his forbears filled the highest offices in this Society, which makes it additionally appropriate that we should have him as a lecturer and as a new Fellow of the Society.

Major Hamilton is an officer of the Royal Scots Fusiliers who, in 1931, was

seconded to the Aden Protectorate levies, and since 1936 has been a political officer in the Administrative Colonial Service, and as such commanded the Aden Protectorate Guards in 1938. Duty taking him to Shabwa, his strong interest in the history of the country and its people naturally led to the work of which he is to give us a first account this afternoon.

Major Hamilton then read the paper printed above, and a discussion followed.

Mr. STJOHN PHILBY: I have been looking forward to this lecture with great interest, and it is a particular pleasure to me now to take part in the discussion, not only because I had the honour and pleasure of being Major Hamilton's predecessor at Shabwa, but because exactly a quarter of a century ago his father and I were colleagues on a historic mission to Central Arabia to the great King Ibn Sa'ud, and I think Major Hamilton's father then agreed with me in the theory that we had found the Man of Destiny of Arabia. Therefore it is really a great pleasure to come here and to listen to his son speaking about a part of the world so little known, and known to myself, probably better than to anybody in all this world, I might almost say including Major Hamilton.

When he started by quoting a sentence from my lecture of five years ago and then contended that my statement had not altogether been justified, I came to the conclusion that my statement still holds. I had maintained that all that was possible had been done on the surface of the earth at Shabwa and that the next comer must be an archaeologist. I claim Major Hamilton as the first of the archaeologists. It is not for me to say whether he has done his work well or badly, but he certainly has had to work underneath the surface to add anything to our knowledge of the place.

My maps also still hold. I came here in fear lest I should find that they had been twisted askew or dislocated in other ways by Major Hamilton's very searching investigation. It is a great satisfaction to myself, and I hope to the Royal Geographical Society, to have produced maps which have withstood the scrutiny of so close an observer as Major Hamilton.

Most interesting is Major Hamilton's theory that the walled city of Shabwa is a cemetery, a collection of mausolea and graves. I do not think that I am yet quite satisfied that he has proved it, but he has certainly given us reason to think it may very well be so, and I echo his last words, that archaeologists should go out and determine the facts of this walled city, the uselessness of whose walls Major Hamilton has so ably demonstrated.

Major Hamilton did not tell you that some of the main dwellings at Shabwa, which I regarded as the palaces of the kings and the mansions of the nobles, were on that little ridge to the east of the walled city and completely unprotected. I suggested that the reason was that Shabwa was then living in a period of prolonged peace, and that people had not even considered it necessary to wall their mansions and city in against an enemy, and that the old walled city represented the survival of less secure times.

I do not suppose that Shabwa goes back very far into history. Major Hamilton mentioned having passed 'Uqla. I assume he did not do so without seeing the inscriptions I found there. Some of them do more or less make it possible to date the earliest period of Shabwa. The earliest date of all the kings mentioned in my inscriptions was about 115 B.C. Incidentally, the kings who left us the inscriptions on the 'Uqla rock mentioned that they had taken certain steps for the repair of the temple of Shabwa and that they made certain offerings of a somewhat curious kind, including eight leopards on one occasion. Major Hamilton did not tell us whether he had seen any leopards in the vicinity. I

think no doubt they do exist there. I did not see them myself, but I should not like to have to produce eight for sacrifice! They are not common.

As you get farther west you get into a much earlier period of history. The inscriptions I found in some of the places in the west go back to about 900 B.C., so that there is a tremendous gap and, incidentally, the Shabwa kings in leaving their inscriptions informed us that their brother kings of this western district, then known as Sheba and Raidan, had actually sent what is translated by our experts as an embassy, anyway a representative body, to take part in the various sacrificial arrangements.

I gather that in what Major Hamilton considered to be graves he did not find anything justifying his theory. I am not quite sure that I heard him accurately, but I believe he certainly did not find any burial in situ. He did find one or two bones. I take it that he did not succeed in finding anything to justify his very possible and indeed plausible theory that these are mausolea. I had a similar experience, because in that west country that I passed through I came upon not a few hundreds of graves such as there may be in Shabwa, but tens of thousands of graves scattered about the whole hillsides in amazing profusion and which I investigated with considerable care. I looked into some hundreds and I did not find a single trace of any kind of thing which could have been buried there. I found a dead fox and other things, but certainly nothing that had been put there on purpose; not the vestige of a bone, a bead, or any such relic. They may perhaps have been cenotaphs. We have been told by Pliny and Strabo, who have repeated the old travellers' tales, that the people of Shabwa treated their dead as of no account and used to throw the corpses out on to the rubbish heaps. I wonder whether in compensation for that the people went hundreds of miles into the desert and built up cenotaphs to commemorate the dead. I think they may be not only mausolea but empty mausolea. I venture to suggest that they were funerary monuments to commemorate those whose corpses had been thrown out on to the rubbish heap.

I have been extremely interested in Major Hamilton's lecture and I would like, in your name, to thank him for his exceedingly valuable contribution to our knowledge of Shabwa.

The PRESIDENT: There is a very distinguished archaeologist amongst us. I do not know whether he could be tempted to go to Shabwa, nor do I know whether he wishes to add anything to the discussion. If there is any observation that Sir Leonard Woolley desires to make we shall be very glad to hear him.

Sir LEONARD WOOLLEY: I was extremely interested in the lecture and not least so because it rather posed a problem than solved it. I quite agree that the theory of tombs, locular towers similar to those at Palmyra, is tempting at first sight, but there are certain points in the evidence which I confess I do not understand. We saw the small so-called tomb chambers side by side, and we were told that they were superimposed. I did not see evidence of other superimposition, but I gather that the theory rather is that the tomb was occupied, filled in solidly with earth, and that over that was put a coating of friable plaster over which presumably the next grave would be made. But I could not see that there was any evidence of there being such a superimposition of actual provable graves.

The character of the plaster did not seem to me very funereal, and I could not help remembering another feature of the countryside which is entirely strange to me—I am only speaking of what I know from books. Those towers might be tomb towers, but they were also rather like the lower stories of those very lofty mud-built palaces to be seen in the Hadhramaut to-day.

I was impressed on seeing the photographs by the enormous amount of light

rubble that covered the site. That must have come from somewhere. It looked to me as if it came from superstructures built with rubble walls on a lower course of extremely heavy masonry; and those superstructures must have been of considerable height to account for the amount of fallen stone. The modern skyscraper of the Hadhramaut has no entrance door at ground level, nor had these towers. The lower part of the modern buildings is used as store chambers, and these partitioned compartments with mere mud-built walls between the stone outer walls of the building looked to me more like granaries than like actual tombs. I may be entirely wrong. I am speaking from no knowledge. It is just because the problem is so fascinating that I am particularly glad to have been able to come to this lecture and to hear what was a most enlightening account of the whole area, but I quite agree with both speakers that the last word has still to be with archaeology. I do not think it has been spoken yet.

The PRESIDENT: There is also present Sir Bernard Reilly, until recently Governor of Aden. Perhaps I may call upon him to say a word or two on what this member of his staff has told us.

Sir BERNARD REILLY: I do not think I can add anything of value to what has been said. I had the pleasure of visiting Major Hamilton when he was engaged in his investigations at Shabwa, and in my amateur way I was greatly interested in what he told me about what he was doing there.

As to the theory propounded to-day, I fear I can offer no contribution beyond saying how interested I personally was, as I am sure the rest of the audience have been, to hear the various theories that have been advanced.

I would like to pay a personal tribute to Major Hamilton, who has been unduly modest in describing himself as simply a Political Officer with no interests beyond those a Political Officer is supposed to have. It is most satisfactory when one has members of a political staff who take so wide and general an interest in what they find in the country to which they are sent. It adds much to the attraction of the country to them and it rebounds on the work they have to do for the modern people who are there and with whom they have to deal, that they take this vivid and intense interest in the historical background that they find in the country in which they live and work.

The PRESIDENT: It is getting late, and we must draw the meeting to a close. We have had a most interesting lecture, followed by particularly interesting comments from two of the greatest authorities. We echo the wish of the lecturer that in the happier years we hope lie ahead these problems will receive the attention of expert archaeologists, and that we shall then learn the real history of Shabwa.

I may add *en passant* that I am inclined to mausolea or whatever the word is. I also think that the main house Mr. Philby referred to as being outside the walled city might be not so much the palace of the king, however glorified he was, but rather the residence of the caretaker of the cemetery.

Additional note by the author

There is no resemblance between the small chambers excavated at Shabwa and the lower rooms of existing South Arabian houses. Had these chambers been small byres used for keeping stock at night or for stores, they would have had some access to the air. They would certainly not have been packed with earth and sealed with plaster, as they were found to be. Nor is there any reason why human bones should have been found in them, and the bones found were undoubtedly human, with the exception of some found in the Hall.

I think it must be accepted that a small chamber, packed with earth, without either doors or windows, and sealed under a layer of plaster, containing human

bones, is a grave of some sort. Particularly where such chambers are superimposed one upon another.

The interpretation of the very old relief inscription "The House of Yafa'," which was excavated from point 6 on the photograph, where it appeared to have fallen, points to the building being a mausoleum of the followers of Yafa'. This is the name of one of the largest confederations of tribes in South Arabia. An inscription photographed on the main building of the ruin of Am 'Adia on the eastern spur of the Yemen plateau near Beidha reads "Yafa' Daba," which can be translated "Yafa' is strong," in modern dialect. Yafa' was probably the name of a deity and it is suggested that the priests or followers of this deity were carried to Shabwa for burial. If that is found to be so, it will be an additional proof that Shabwa was the holy burial place of all this area.

MAKING THE BRITISH COUNCIL MAP

ARTHUR R. HINKS, C.B.E., F.R.S., Sec. R.G.S.

Meeting of the Society, 11 May 1942

IN February 1940 the late Lord Lloyd, then Chairman of the British Council, proposed to our then President, Field-Marshal Sir Philip Chetwode, that the Society should undertake to make a map in Arabic characters of existing and potential war areas: Europe, North Africa, and the Middle East up to the Indian frontier, which he thought would be of political importance and use in the work of the British Council.

In the course of subsequent discussions the area to be shown was extended eastward to include Rangoon; it was agreed that the relief of the land should be shown in the best way possible; and that the map should aim at being a credit to British cartography and to the British Council which desired it. In a few days, then, the R.G.S. staff committed themselves to making a more ambitious map than any yet produced by the Society.

The success of the map of Jan Mayen Island, printed by Harrison and Sons, Ltd., from only two photogravure plates, for the *Journal* of August 1939, had shown how economical in number of plates the photogravure process might be, and we had been anxious to try it on a more ambitious scale. Here in the British Council map was the opportunity for a bold experiment. After consultation with Mr. Hugh Harrison and his technical staff at High Wycombe we felt justified in planning the map for the largest plates that the photogravure machines would take, 38 by 25 inches, and in trying what could be done with six printings.

For a long time the project was, in the files of the British Council, the Arab map, though it soon became evident that as the name plate would be compiled in English, an English edition would naturally be produced at the same time as the Arab; and that if one took care to keep all names and numerals on the black plate, there was nothing to prevent editions in any language or characters.

Projection

When the map was proposed, I thought at once of using Murdoch's Third Conical Projection, for which the general guide table was already calculated. By this I could plan immediately the breadth of the zone to be made of true area and the scale along the limiting parallels. It is the great and unique advantage of this projection that the figures for the breadth of zone and the limiting scale errors are independent of the latitude (see *Geogr. J.*, June 1941). The projection is not orthomorphic, but the meridians are at least perpendicular to the parallels, which for rapid compilation is essential. To allow for scale errors in one direction is sufficiently troublesome; and any slant of the meridians to the parallels is fatal to speed. A preliminary table of coordinates for the graticule was calculated in an hour or so, the projection sketched out, and a rough outline drawn enabling us to fit over it a frame of the maximum dimensions for the photogravure plates.

The ruling conditions were that Great Britain should appear more or less the right way up, although away in the top left-hand corner, and that the map should include Aden and Rangoon. This required that for economical use of the space the projection should be oblique to the margins, and one soon saw that no drawn 10° meridian should be perpendicular to the edge, or it divided the sheet unpleasantly into two unequal parts. The maximum scale which would satisfy the conditions of content of map and size of sheet was 1/11M. It was soon found that the meridian 17½° E., not to be drawn, should be the vertical, and from this I calculated the final table of coordinates of the projection, which was readily done with the *Facit* Calculating Machine and Peters' tables of natural trigonometrical functions to 0·001°.

The total area of a belt between latitude 63° and 15° N. is true and the scale values on these parallels are 1·063, that on the mid-parallel of 39° being 0·971. The parallels of true length prove to be 55°·114 and 26°·896. Scale error of the parallel naturally increases rapidly outside the parallels that border the area shown true, but those south of this area are largely in the sea, and north of it are confined to a small area by the convergence of the meridians.

Contours

Since the basic material for the compilation would be largely the 1/M sheets of the International Map and the 1/4M Map of Asia published by the Geographical Section, General Staff, contours were naturally in metres. The Convention of the International Map defined certain contours: 200, 500, 1000 . . . as "courbes maîtresses" and required that these at least should be shown on all 1/M sheets. It further defined the 100-metre contour as "pas obligatoire mais nécessaire." A study of these sheets soon convinced us that not only the 100-metre but the 50-metre contour was essential for a sufficient representation of the ground. It was not easy to obtain the necessary information in all cases, as in Arabia and Asiatic Russia, and in places our representation of this contour is sketchy, but although its insertion gave much trouble we are convinced that the result is worth it because one can by its aid so readily distinguish between a flat and an elevated coast. Even on the scale of 1/11M the contours very rarely run together.

We have shown no contours in the sea. They tend to obscure the character-

tic shape of the coast and if the sea is layer-coloured, to confuse still more he coastal outline.

Layer colouring

The usual pattern of colours for the layer sheets, changing from green to uff and brown or red, seemed to us unsuitable for the map: so much arid esert would have been coloured green, so many cold high mountains coloured ed. We therefore resolved to attempt the necessary twelve tints in one olour. The ordinary process of laying tints upon lithographic plates would ave required three or probably four plates (see the War Office *gamme* for he 1/M map which accompanied the resolutions of the second conference in aris, 1913). A single photogravure plate can reproduce a wide range of elicately graded tints; the problem was to make a drawing with the necessary ne gradation.

Messrs. Denny and Jordan spent a week mixing grey and white poster olour to make a scale of what looked like equal changes of tint: we expressed thus because the effect of contrast at the line of junction between one tint nd the next probably dominates the perception of the whole scheme, and it by no means sure that a scale of measured equal changes of tint would ppear equal.

We intended that this layer tint should be light in colour, proceeding by ery small differences of tint, to avoid the step-like effect of the ordinary yer plate, and to produce a result more like the layer-colouring on the Fifth elief Edition of the one-inch map of the Ordnance Survey now abandoned.

As an essential accessory to the effect of relief, it was decided to have a hill-hading plate corresponding to a light thrown from the left-hand top corner f the plate, this to be very delicate and printed in a lavender grey.

Borders

We had for some time found borders to a map inconvenient, especially hen the projection is oblique. It is then difficult to figure the graticule. So e decided to have no border but a margin of 1 inch all round to give space or figuring the graticule, stating the scale values along the parallels, and other ccasional information. We did not realize at the time how important after-ards this absence of border would prove. But we would suggest for con-ideration that a frame or border to a map is often a mistake. It used to look andsome when it was decorative; when for economy of time or change of aste it is made plain, it may be better omitted. This gives freedom and room or ingenuity in planning extensions of the sheet, as will be seen.

Names

The English Edition of this map shows the first attempt to use our quill-en lettering throughout upon so important a map. The large size of the sheet ade it necessary that the drawing should be for reproduction to the same ze and not with the usual reduction. We resolved to keep the names latively few to avoid masking the representation of relief, but found never-heless that we had about 2100 names and 1100 contour and spot heights. rom the lists of principal towns in the *Statesman's Year Book* we selected

first the cities in densely populated countries which had more than about ninety thousand people. This naturally gave too many names in England and in Germany. We chose those that were more important historically or politically and added a certain number below the first limit that had become prominent, *e.g.* Vichy. In less densely peopled countries the limit was naturally much lower, but we were careful to avoid anything like a uniform distribution of names. The town signs, in red, are put upon the communications plate and can usually be identified even if there is no space for the name. Ligatures on the black plate show to which town sign the selected name belongs.

The principal names on the English map are often in the conventional English form; other names as used by countries that write in the Roman character; otherwise they are transliterated by the rules of the Permanent Committee on Geographical Names. We should have wished to show larger district names of historical importance, but found that in general there was not sufficient room for them.

The corresponding plate for the Arabic edition was prepared under the supervision of Professor H. A. R. Gibb, who had from the inception of the map taken a keen interest in the project of this Arab map. The names are being written in a plain straightforward style of Arabic.

Communications

Principal railways are shown in single line and roads with fine dotted line, all the town signs being also on the same red plate. The scale is too small to make the communications plate a real guide to the roads and railways. Only main railway lines are shown in well-developed countries, and no attempt is made to distinguish gauge, or steam from electric traction. But the network spreads over highly developed countries as a delicate spider web of red which clearly distinguishes them from the undeveloped countries. Roads are necessarily highly selected and not always for their high grade, but rather as routes to those places that are not served by railways. Important desert routes are shown in the same symbol without any attempt at classification, but occasionally an important caravan route is named.

Major oilfields are shown by symbol, as are principal pipe-lines.

Political boundaries

Political boundaries are shown as before 1938 and the names of states as before enemy aggression in that year. Boundaries of the Soviet Republics are shown from the Great Soviet Atlas, but in general the map shows no other internal boundaries nor international boundaries not yet demarcated.

Compilation

Subject to the necessary revision the outlines and contours were reduced from the 1/4M by the Coradi suspended pantograph in small sections of a few degrees, but even with the relatively small scale-error on the outer parallels drawing proved to be tedious from those reductions and experience would prefer a close latitude and longitude mesh with compilation traces showing the complete content of each cell of the mesh.

Drawing

First a combined drawing showing contours and rivers was made on Aquarelle Board. This was photolithographed in pale blue on Bristol Board for drawings for the four line-photogravures—names, rivers, communications, and contours—and upon Whatman's hot-pressed paper, dry mounted on stiff board, and on Bristol Board respectively, for the drawings for the tone photogravure plates—layers and hill shading. Careful measures of register marks on each drawing showed variations at first of a few hundredths of an inch in 36 inches, which gave some anxiety. But they settled down, and five of six drawings eventually agreed within range of 0·01 inch from the mean: one drawing, that for the layers, was not quite so good.

Reproduction

When it came to negative making, it was at first impossible to obtain plates of the necessary size, 38 by 27 inches, and the first attempts were made upon film, which facilitated making the positives necessary for the photogravure process. The result was very nearly successful but not quite good enough. There was a range of several hundredths of an inch in 36 inches due to shrinkage and distortion of the film.

Then after some months we succeeded in obtaining the plates on glass; and the reversed negatives, made with the precision camera of Messrs. Waterlow and Sons, Ltd., when tested against a positive of the river and outline plate had no visible misfit except in two out of the six, which differed by plus or minus 0·01 inch in 36 inches. By good fortune the layer negative, made from the drawing which had given us most anxiety, was one of the better fits.

The negatives for the line photogravure plates required only stopping out accidental pin-holes. To get the best effect with the negatives for the tone-photogravure plates, it is necessary to paint out the sea before making the positives.

It was admittedly an ambitious experiment to try producing so large and elaborate a map in present conditions and by a process which had not before been used for such a map. At one time we intended to try the further experiment of lithographing the line plates and making only the tone plates for layers and hill shading by photogravure, but that was judged to be too difficult in present conditions; and trials of line-photogravure showed that the definition left little to be desired while the impression appeared to be more intense than by photolithography.

Paper and folding

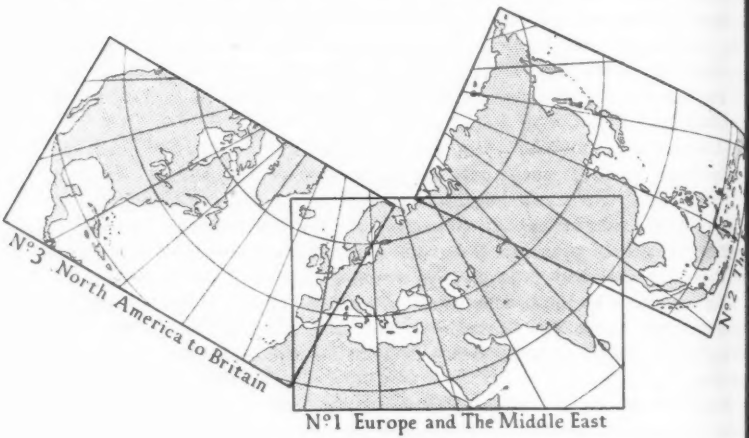
On the advice of the Director-General of the Ordnance Survey we were able to obtain a very strong paper, half linen, half cotton, a new product of Messrs. Towgood's mill at Sawston, which passed stringent tests for folding and tearing. It has the great advantage that it is not really necessary to mount on fabric, which is unobtainable in these days.

After many experiments we decided on folding the sheet 38 by 25 into twelve in two rows of six, making a folded map $12\frac{1}{2}$ by $6\frac{1}{2}$ face outwards, so that any desired part may be opened as a book without unfolding the whole. It has the advantage that the twelve thicknesses of this size in fairly stiff cover

can go through the post without much risk of damage; can lie easily on a shelf, and be stocked by booksellers without inconvenience. The covers are attached so that a single motion opens out the whole map, letting the lower half drop by gravity; and it is equally easily folded up by turning the lower half back against a table. The map will also be sold flat.

Extensions: B.C Maps Nos. 2 and 3

Long before No. 1 was completed, extension of the war area made an extension of the map desirable. To produce merely adjacent sheets did not meet the case. To cover the desired areas they had to overlap along lines oblique to the meridians, which was easy if one kept to the same projection for all three sheets. So we made sketch projections and outlines for No. 2, "The Far East," and No. 3, "North America to Britain," and began the



amusing game of seeing how much could be got into two more sheets of the same size as the first but arranged obliquely. By a combination of good fortune in choice of the original scale and of some ingenuity in planning, we found that No. 2 could take up the extension of the northern Russian coast eastward and just get to Bering Strait, and could include half New Guinea, Darwin, and the west end of Sumatra, as shown in the diagram: while No. 3 could overlap No. 1 to the west along the line Petsamo to a point north of Dakar, and take in Vancouver, Panama, and the southern shores of the Gulf of Mexico. This was largely good luck but a little good management. The final idea for placing No. 2 was due to Mr. Denny.

We soon decided to produce Nos. 2 and 3 to be ready in outline for publication with the finished No. 1. They would be useful if not ornamental. The edges of No. 1 are marked on Nos. 2 and 3: to join the sheets we trim off or turn in the inch margin of No. 1 where necessary and apply to Nos. 2 and 3 along the line indicated. This device has many possibilities for the future. Map No. 2, named "The Far East," is far from being a good map of

the Pacific, which is too large altogether to be shown on any conical projection. We are experimenting with an oblique Airy-Clarke which has some promise for eventual realization as British Council Map No. 4. No. 3 might properly be named "Carta Atlantica," but as it includes most of North America to the Pacific coast we will call it "North America to Britain."

DISCUSSION

Before the paper the PRESIDENT (Sir GEORGE CLERK) said: I know you will all join with me in regretting very much that our Secretary, Mr. Hinks, is prevented by illness from being present this afternoon, and will wish him a speedy recovery. He was to have given us an account of the making of the British Council Map of Europe and the Middle East, upon which the Society has been engaged for some time past. Happily for us, Mr. Hinks' son, Captain David Hinks, has been able to take his father's place, and will read the paper. We are very grateful to him for undertaking this at such short notice. He will describe the general features of the map, and some of the problems that have arisen in the making of it. Then Mr. Denny and Mr. Jordan, the draughtsmen who have been carrying out the work, will deal with some technical points.

You may like to examine after the meeting a number of the drawings which are displayed in the Ambulatory.

Captain David Hinks then read the paper printed above, and a discussion followed.

Mr. C. E. DENNY: The idea of representing the communications as a thin spider's web was to bring out those countries which have a highly developed communications system. That this plate would be printed in red over the rather elaborate physical representation demanded that the symbols used should be light. It was also desired that the town sites should be on this plate so that the man-made features should be together. With these points in mind we decided to show railways in a fine continuous line and the roads in a fine dotted line, as being the most compact symbols, and to draw the largest cities to scale. We were able to show a great many more town sites than could be named, and we think that those towns which have been named will give a clue to the others shown only by their town signs.

Reference has been made to the use of quill pens, and I should like to explain the reasons for using them. We have been developing this method for maps in the *Journal* for a long time past; the usefulness of the quill lies in the fact that we cut the pens to a chisel-shaped point which enables the thin and thick strokes of the letters to be drawn in one operation. With the pen held in the writing position a line drawn in a south-west–north-east direction gives a thin line and a line drawn at right angles (north-west–south-east) gives a thick line, so that in describing a circle with the pen a letter *o* is formed complete with its thick and thin strokes.

Thus we are able to produce an italic alphabet and a set of numerals that require no more elaborate formation than careful handwriting. After the names have been arranged and guide lines drawn in it is possible to write something like one hundred italic names a day. For the Roman capitals and lower case alphabets the thick and thin strokes of the letters are produced in one operation but the serifs are built on in the process of making the letters. This requires rather more skill, but nowhere need we draw two fine lines and fill in between to produce a thick stroke.

Mr. K. C. JORDAN: There are one or two points I would like to mention with

regard to the hill-shading plate, for which the drawing was made entirely with pencil.

One feature on the hill-shading drawing is the representation of land below sea-level. The customary method of printing blue over one of the layer tints seems to emphasize these areas too much, and also confuses the relief of the map. Here we have used merely a flat tint of the hill-shading plate printed over the lowest layer tint, so that in flat areas, such as the Low Countries, this will appear as a warm flat grey tint and in the mountain formations, such as the Turfan depression and the Dead Sea, it will form part of the relief as well.

In several regions we have shown the areas of lava, which are important natural features, by line work on the hill-shading drawing, which in no way confuses the relief.

At first we had intended to use a pale shade on the blue river plate for the oblique shading over the snow areas, but, on second thoughts, felt that the use of two separate colours to show the relief of a single form tended to break up the general effect of the relief, and that a cold grey for the hill shading would be quite sufficient to suggest snow shadows, where it fell clear of the warm colour of the layer tints.

The use of poster colour for drawing the layer plate is probably the most original feature in our methods. The photogravure process can reproduce a large number of tints from one original, and here we have succeeded in obtaining twelve shades of one colour from a single printing.

Before work was started on the layer-colour drawing we spent some time and trouble in preparing our separate tones of poster grey. Having once made them, we were then able to apply them to their correct contour interval in any order we chose for convenience, since each could be painted in its own separate band, and we were able to complete small parts of the map before proceeding to the next, knowing that the paint we had prepared would always dry to the tint required.

The PRESIDENT: I do not know whether there is any expert present who would like to offer further observations on the map. If not, I can add only that it has been most interesting to assist vicariously at the genesis of this particular map, which is something quite new of its kind but which I feel, when it is completed, will not only be of very great value to geographers and to the world in general but also reflect great credit upon the Royal Geographical Society and its staff. To take one small point, the lettering, if I may say so, is quite beautiful. It is clear and its shape is pleasant. Altogether the map is a fine production, and I think we may be proud of it and most grateful to our map-makers, our Secretary, Mr. Hinks, and his assistants.

LIEUT.-COLONEL SIR FRANCIS EDWARD YOUNGHUSBAND,

K.C.S.I., K.C.I.E.

Gold Medallist 1891. Council 1911–14. Hon. Sec. 1914–16.
Vice-President 1916–19, 1922–42. President 1919–22

SIR FRANCIS YOUNGHUSBAND was born at Murree on 31 May 1863, the second son of Major-General J. W. Younghusband. Educated at Clifton and Sandhurst, he was commissioned to the King's Dragoon Guards in 1892, and was soon in India, where his regiment was stationed at Rawalpindi.

His enthusiasm for travel in the Himalaya was first stirred by a visit he paid on leave in 1884 to Dharmsala, the home for many years of his uncle Robert Shaw. There he talked with men who had accompanied Shaw to Yarkand and Kashgar, and examined books and relics of those journeys. He then set off on his first tour in the Himalaya, through the valleys of Kangra and Kulu, discovering the "delicious sense of satisfaction as each long day's march was over, as each pass was crossed, each new valley entered." On his return to duty he was sent at the age of twenty-one on a reconnaissance of the Indus and the Afghan border, and later attached to the Intelligence Department to revise the gazetteer of Kashmir.

His first great opportunity came when Mr. Evan James invited him to join in a journey through Manchuria. For seven months they travelled in that then little-known country, penetrating to the sources of the Sungari in the Changpai-shan, and later crossing the northern end of the range to Hunchun. These journeys are described in detail in James' 'Long White Mountain,' and briefly in the first three chapters of 'The heart of Asia.' At the end of this expedition Younghusband proposed to spend the winter in Peking, and to return to India by sea. While in Peking however he met Colonel M. S. Bell, who was preparing to journey overland to India. Younghusband was eager to accompany him; Bell, thinking it a waste of opportunity for both to travel by the same route, suggested that they should arrange to meet at Hami. Younghusband therefore, having secured an extension of leave, decided to travel by the direct route across the Gobi, while Bell journeyed through the more populous provinces within the Great Wall. Younghusband's route had not been traversed by a European, and lay between the usual route to Chinese Turkistan and that followed by Ney Elias in 1872. After three months of preparation he left Peking on 4 April 1886 with one Chinese servant, and traversed the Mongolian plains to Kalgan and Kweihuachang, where he arrived two weeks later. There he engaged a Chinese camel man, his Mongol assistant, and eight camels for the crossing of the Gobi. The monotony of those long dreary marches was broken by the extreme beauty of the clear starlit nights, and the changing colours of the desert landscape. He noted in his diary how one morning the plain "fades away in various shades of blue, each getting deeper and deeper till the hills are reached, and these again in their rugged outline present many a pleasing variety of colours, all softened down with a hazy bluish tinge." After seventy days, having crossed the Altai at 8000 feet, he reached Hami, where he found that Bell had preceded him by a month. Reorganizing his party, he exchanged the camels for an *araba*, or

travelling cart, and a pony. Thence he journeyed along the southern base of the Tien Shan through Turfan to Aksu. Sending his Chinese servant by the usual route to Kashgar, he made a detour into the Kirghiz country, riding with an Afghan merchant up the Aksu valley to Ush Turfan, and over the Kara Kura or Belowti pass, the pleasantest part of the whole journey. The stage to Kashgar and Yarkand was along a well-known route much frequented by merchants and pilgrims "declaiming loudly in praise of British rule in India."

At Yarkand he received a letter from Colonel Bell suggesting that he should return to India by the direct but unexplored route across the Muztagh range, which had been abandoned by traders owing to its difficulty and the depredations of Kanjut robbers. Younghusband warmly welcomed this opportunity for further exploration. Having engaged a party of Baltis, who had crossed some years before to Yarkand, and obtained ponies and "some good strong ropes and a pickaxe or two," he set out on September 8. His route lay across the Kuen Lun to Chiraghsaldi on the Yarkand river. It was supposed that the southern tributaries came straight down from the main Karakoram watershed, but he found that another range, the Aghil mountains, was interposed. This he crossed by the Aghil pass. There he was the first European to see the Karakoram from the north; at the foot of the pass flowed the unexplored Shaksgam river. The next day the party camped below the glacier descending from the Muztagh pass. After struggling for three days to get the ponies up the pass, he decided to send them round by Shahidulla and the trade route to Kashmir, and to attempt the Old Muztagh pass with a small party, the New Muztagh having been reconnoitred and found impracticable. On September 28 the pass was successfully crossed, after a hazardous descent of the precipitous ice slope on the southern side. The main obstacle on the journey had now been overcome, and the journey through Askole to Kashmir was uneventful. He finally reached Rawalpindi on November 4, seven months after leaving Peking.

In August 1889 Younghusband was again in the Karakoram to inquire into the Kanjut raids, and to report upon the passes between the Yarkand and Hunza. From Leh he took the trade route to Shahidulla and the Yarkand valley. Following the river down until he struck his route of 1887, he then turned southwards over the Aghil pass once more. Leaving his escort here he pushed on to explore the upper Shaksgam, which he took to be the headwaters of the Oprang, hoping to reach the Saltoro pass. He was obliged however to abandon the ascent of what appeared to be the main tributary glacier on account of snow storms, avalanches, and crevasses. This glacier was subsequently identified with the Urdok glacier. By an oversight Younghusband's note in his diary that the Shaksgam valley continued south-east of the junction with the Urdok was omitted from his printed report, and for many years this caused the watershed to be misplaced on the maps of this region. His identification of a great peak seen from the Shaksgam valley with K_2 also created some confusion later, as his longitudes depended upon it: it has since been shown that it was almost certainly Conway's Staircase Peak (Skyang Kangri).

Returning to his escort he moved down the Shaksgam to a tributary coming from the direction of the Muztagh pass. A short distance up this was joined by a large glacier flowing from the west. At the head of this glacier (Crevasse glacier) was a pass which he thought might be the Shimshal. After struggling for six days to make his way up it with a small party, frustrated by the many crevasses, he was obliged to return to the Shaksgam, which he followed down to its junction with the Yarkand at Chong Jangal, where he had arranged to meet a party of Kirghiz with supplies from Shahidulla. After an anxious wait, the party arrived, and he turned back up the Shaksgam to the tributary coming

down from the Shimshal. A short distance up it the road was barred by a stronghold of the Kanjut robbers. By Younghusband's courage and firmness, friendly relations were established with the garrison, and the next day he crossed the pass, the first European to do so, finding it exceptionally easy, and travelling some distance down the Shimshal valley. Having thus achieved one of the main objects of his expedition, he returned to the Yarkand on the way to the Pamirs. A day's march below Chong Jangal, he met the Russian (or rather Polish) traveller, Grombchevski, on his way from the Pamirs to explore the country north of the Muztagh. Younghusband met Grombchevski, whose name is more accurately transliterated from the Polish as Grabczewski, in Yarkand the following year. Thirty-five years later he learnt that this enterprising traveller, whom he regarded as a friend though a rival, had died in Poland from hardships endured during the Russian revolution. Leaving the Yarkand valley, Younghusband crossed the Ilisu pass and entered the more open and wind-swept valleys of the Taghdumbash Pamir. Approaching winter prevented a long stay, though he was able to visit Tashkurgan and ascend the Kunjerab pass; after three weeks he returned to Hunza over the Mintaka pass, interviewing the chief, Safder Ali Khan, at Gulmit, and thence to Kashmir.

The sketch-map, drawn by Younghusband in 1889, showing his routes through the Karakoram on these two journeys, and his interpretation of the topography, is in the Society's collections, with his copy of 'Hints to Travellers' and his diary of the 1889 journey.

In the summer of 1890, Younghusband, accompanied by George Macartney, was sent on a mission to the Pamirs. Crossing once more the dreary Karakoram pass to Yarkand, they travelled westwards to Tashkurgan, the northerly limit of his route the year before, and then through the Little and Great Pamirs as far west as Yashil Kul, the morainic lake at the head of the Alichur Pamir. Retracing their route as far as Chadir Tash, they turned northward up the Ak Baital valley, visiting two lakes, Rang Kul and Kara Kul, the latter the largest lake in the region, and an impressive sight when swept by a violent storm. Continuing north-eastwards by the Kara-art pass and the Kizil Su, he reached Kashgar from the west, where he stayed until July 1891.

He returned by the most direct route to the Pamirs, up the defile of the Gez, where he was obliged by the heavy torrent to make several detours over low but difficult passes, and down to the Little Kara Kul. There he established that the great peak, observed from Kashgar by Trotter, was not identical with the Tagharma peak visible from Tashkurgan (25,800 feet), but was a separate peak of about the same height on the opposite side of the Little Kara Kul. From Tashkurgan he followed his earlier route to the Taghdumbash Pamir, diverging from it to cross the Wakhjir pass and to ascend the Pamir-i-Wakhan to Bozai Gumbaz, where he met Colonel Yonoff and a party of Russian soldiers. Russia at that time claimed that this area lay within her sphere, and in the face of superior force Younghusband was obliged to sign an undertaking to proceed to Chinese territory, and not to return to India by any of a number of named passes. Younghusband accordingly went back over the Wakhjir, and camped for six weeks in the Kukturuk valley, north of the Kilik pass, experiencing snowstorms and very low temperatures throughout September. There he was rejoined by an adventurous traveller, Lieut. Davison, who had also been turned back by the Russians.

They then determined to make their way back to India over passes not included in Yonoff's list: "always an easy matter in those parts, for the mountains there are rarely too difficult for small parties to get over." Turning up a side valley east of the Wakhjir they found and crossed a new pass, 8 miles to

the south. On this detour they passed by a small lake joined by a stream to a glacier at the head of the Ab-i-Wakhan. The foot of this glacier was later visited by Curzon who argued that it was the true source of the Oxus. After Curzon had read his paper to the Society, and Younghusband had recalled his visit, the former replied "He, as well as anybody who has been in those regions, knows that when you track a great river up to the glacier from which it springs, you must be content to regard that as its source, and not ferret out the little streams that feed the glacier."

Arrived back in the Pamir-i-Wakhan, they once more passed through Bozai Gumbaz, seeking for a pass across the main Hindu Kush range not included in the Russian list. By careful questioning Younghusband found that there was such a pass, unknown to Europeans, but very difficult, and obtained some unwilling guides. Two days beyond Bozai Gumbaz, they ascended a side valley and a 7-mile glacier, and crossed the narrow and deep-cut pass in a snow storm and a cutting wind. The night was spent on the edge of a precipitous cliff overlooking the Karumbar valley: the next morning they found a path to the valley below, down which lay an easy route to Gilgit, which they reached on 13 October 1891.

Thus in the four-and-a-half years between March 1886 and October 1891 Captain Younghusband had, by the time he was twenty-eight, completed the three journeys which placed him among the great explorers of Central Asia. His first accounts of these explorations were given to our Society in the *Proceedings* (New Series 10 (1888) 485; 14 (1892) 205), and the Founder's Medal was awarded to him before he returned from the third. It was not advisable to disclose at once all the details of his routes in the Karakoram and Pamirs, and the maps illustrating these early papers do not always correspond closely with the narrative which he published in his famous book of 1896, 'The heart of a continent,' from which the above summary has been made. The work with the same title, published in 1937, omits Chapters I–III and IX–XVI of the earlier book, covering only the Peking to India journey of fifty years before, with an additional chapter on later travellers.

In 1890 Captain Younghusband had been transferred to the Indian Political Department, and soon after his return from the Pamirs became Political Officer in Hunza, and then Political Adviser in Chitral, where in 1893 he made a long journey with the Mehtar along the northern boundary, which is described in the *Journal* for 1895 (5 (1895) 409). Long leave in 1896–97 was spent in the Transvaal and Rhodesia, and his book 'South Africa of to-day,' published in 1898, was a valuable study of South African politics before the Boer War. In 1902 he was Resident in Indore, and in the same year his appointment as British Commissioner to Tibet began for him at thirty-nine the second great period of his life. His distinguished conduct of the Mission to Lhasa is too great a subject for narration in a brief memoir, but three of his officers have contributed their remembrance of him as a leader and a friend. His book 'India and Tibet,' published in 1910, is a masterpiece of historical and political geography. Soon after his return from Lhasa he was appointed Resident in Kashmir, and he retired from the Indian Service in 1909.

In 1919 he was elected to succeed Sir Thomas Holdich as President of the Society and next year became the first Chairman of the Mount Everest Committee, in which responsible and not always easy position his tenacity of purpose and his great knowledge of mountain travel beyond the frontiers of India were equally engaged. The relatively great successes upon the first expedition, of exploration, and the second and third, of climbing higher than has been done before or since, owed much to his enthusiasm and judgment. Mount Everest

was always in his thoughts and on his tongue: once when he meant to say Mount Erebus. In the last ten years of his life he gave most of his time to his Presidency of the World Congress of Faiths: and one may see in the seventeenth chapter of his first book of 1896 that this was no new interest but had been in his thoughts from early manhood. He died after a very brief illness shortly after the last meeting of the Congress.

To this bare outline of a long, full, and distinguished life, three of his officers on the Tibet Mission, Lieut.-Colonel Sir Frederick O'Connor, Colonel C. E. D. Ryder, and Lieut.-Colonel F. M. Bailey, wish to add their tributes to the memory of their chief.

It was in 1903 that I first met Sir Francis (then Major) Younghusband when he arrived in Sikkim as Commissioner of the Tibet Mission, and in my capacity of Secretary and Interpreter to the Mission I was constantly by his side for the next fifteen to sixteen months till, after the signature of the treaty at Lhasa in September 1904, he, with the rest of the Mission and escort, returned to India, leaving me behind as the first British Trade Agent at Gyantse. I thus came to know him very well and was able to some extent to understand his mentality and his attitude towards current events and life in general. He was a perfect chief to work under. His outstanding characteristic was, I think, his imperturbability. He was never fussed or flurried, always courteous and good-tempered, and perfectly precise in his decisions and instructions. He lived very much in a mental atmosphere of his own, and based his policy for the conduct of the Mission on certain principles carefully thought out and uninfluenced by minor considerations and expediencies. Although always ready to listen to suggestions, he never allowed himself to be swayed by any one contrary to his own deliberately formed judgment.

As an illustration of these characteristics I may mention the occasion when he calmly announced to me one morning his intention of riding over, unescorted, from our camp at Tuna to the Headquarters of the Tibetan army a few miles away, with the object of having a heart-to-heart talk with their leaders. He thought that he might be able to induce them, and through them to persuade the Lhasa Government, to take a more reasonable view regarding the purpose of our mission, and so to avert the fighting and bloodshed which now appeared inevitable. It is a matter of history how, accompanied only by myself and a young officer of the Sikh Pioneers, he rode into the hostile camp, conferred for a couple of hours with the Tibetan Generals and Lamas, and rode back again unmolested. But it was touch and go. I know that we were within an ace of being arrested, and I believe it was only his superb aplomb and coolness that saved us. There is no denying that, however good the intention, it was an unduly risky proceeding, and if we had been made prisoners it would have created a most embarrassing situation for our Government. But he had thought it all out carefully, and he acted as his conscience directed from the highest motives.

Similarly at Lhasa, when the rapid conclusion of a treaty became a matter of urgency and time did not allow of references back to our government, he acted on his own judgment, formulated terms (some of which were afterwards disavowed by the British, not by the Tibetan Government, as too severe), presented an ultimatum to the Tibetan Government, and secured the signature of the treaty on the date he had fixed. It was a great achievement and showed immense moral courage and self-confidence. There are not many men who could have done it,

or who, especially in view of our somewhat drastic proceedings both military and diplomatic, could also have left behind so friendly an atmosphere. He may be criticized, and indeed he was severely criticized at the time, but the broad fact remains that he was successful, and in my opinion his success was due to a great extent to his remarkable gifts of character: courage, sincerity, and broad-mindedness, based upon the principles and the philosophy which he had elaborated for himself and which guided him throughout his life.

FREDERICK O'CONNOR.

Frank Younghusband had the quality not only of extracting devotion and the best work possible from his subordinates but also that of loyalty to them and of supporting them through thick and thin. I speak feelingly as on the Lhasa Mission, when I was in charge of the Survey, I was at first definitely under Younghusband and with his permission started to explore and survey the Chumli valley. Here I was met by the General commanding Younghusband's escort and ordered to return. I did so but referred the matter to Younghusband for a decision, under whose orders I was. Naturally, as he was a well-known explorer, I wanted to be under him, and so by higher authority it was decided, with the proviso that "if military considerations predominated" the Survey party was to be under the General. When later on we were attacked at our post outside Gyantse in the very early morning and collected on the roof of the main house, Younghusband said to me with a laugh, "I'm afraid military considerations predominate." And so it was that for the rest of the time I was under the General, but always had the warmest support from Younghusband whenever I wanted to get surveys carried out: especially was this the case with the proposed trip down the Brahmaputra, which was negatived by the Viceroy, and with that up the same river, which Rawling and I, supported by Bailey and Wood, so satisfactorily carried out. But, throughout, the mainspring of any enterprise was Younghusband's. He had a most loveable character and we all loved and admired him.

C. H. D. RYDER.

As a very junior officer I owed a great deal to my contact with Younghusband. Several lessons remain prominently in my memory.

First: If you are offered an appointment and *want* it badly, rush at it! The proposed mission to Tibet in the 'eighties of last century was abandoned because the leader went to London and Peking to make arrangements. When Younghusband was ordered to Kampa Dzong in 1903 he came at once to Sikkim, picked up a double company of my regiment, the 32nd Pioneers, who were making roads, and marched them straight up to Kampa Dzong without any fuss or publicity.

Second: His marvellous calmness, patience, and persistence in his difficult negotiations with the Tibetans. I was present at many of his meetings with them. Their arguments were so hollow, full of repetitions, and so easily confuted that one felt inclined to interrupt and tell them to stick to the point and not talk nonsense. Younghusband was perfectly patient through it all, repeated his side of the question with calmness and, as we know, finally wore them down. It must be remembered that he had not *all* the military strength on his side; the Tibetans had that grand ally winter, and in what Younghusband had to do he was restricted by a narrow time limit.

Thirdly: It does not do simply to know the right thing and to do it, but you must also persuade your superiors that you are right. This was not easy with a Foreign Office in Simla cut off from realities in connection with the North-East Frontier—now, in 1942, unexpectedly a locality of such critical

importance. In this connection I may perhaps be allowed to quote from an encouraging private letter written to me many years ago:

"You will, of course, have heaps of heart-breaking disappointments in the future, for the dear old Political Department is a most maddening service, and for years you are treated as if you are a dangerous lunatic whom it would be unsafe to allow at large. But then the wheel comes round again and they suddenly discover that there never was such a splendid fellow as yourself . . . and clean away through increase your efficiency as much as you possibly can. That is where we generally fail. We have heaps of pluck and spirit and all that kind of thing but we often lack—I have felt it myself—what can only be acquired by good hard training and intellectual effort. You have to learn how to fight official battles, not for your personal advancement but for the job you are on whatever it may be. There is a point, of course, when, as a servant of Government, you have to accept their orders and there is an end of the matter. The responsibility for results rests with them and not with you. But, in the Political Department especially, it is the duty of the local officer to get the local views before Government with all the force he can, and I think it is well to learn young how to do this effectively. Lord Cromer is a splendid instance of a man who learned how to manipulate governments for his local purposes. . . . Perhaps we might still have been in the Chumli Valley if I had known better how to handle Government. The first essential is to *know* them, know their way of looking at things, and when you have learned all this you have to learn how to present your case to them in such a way as to ruffle up as few as possible of their prejudices and enlist as many as possible of their sympathies."

My excuse for this long quotation is that I think it reveals the character of this great man and his willingness to help a young man early in his career. I only wish I had paid more attention to this advice which should be drummed into all young officers who aspire to a similar career. Younghusband wrote a good deal more on this subject in Chapter IX of 'The light of experience.' The whole of this chapter should be studied both by every young frontier officer and also by his superiors who have to deal with him and his problems.

Younghusband had the power of extracting the best from his subordinates and inspiring in them respect and admiration to an extraordinary extent. I shall never forget his departure from Lhasa. I was one of a small escort of mounted infantry who accompanied him by double marches to Gyantse: the Treaty in a despatch box on which I was told that I had "better put a special guard." The troops followed us down the road cheering him for half a mile.

F. M. Bailey.

REVIEWS

AFRICA

THE BERLIN WEST AFRICAN CONFERENCE. By S. E. CROWE. (R.E.S. Imperial Studies. No. 19.) *London: Longmans, Green*, 1942. 9×5 *inches*; x+250 *pages; sketch-maps.* 15*s*

This monograph details the diplomatic events which preceded the Berlin Conference of 1884–85, the course of the Conference, and the parallel but less public negotiations for a territorial settlement in West Africa. The author has made extensive use of hitherto unpublished Foreign Office papers and has examined a wide range of printed material. The text is a condensed narrative with full references, and not a collection of documents, for these are rarely quoted textually.

The results have hitherto been studied mainly from the point of view of "the partition of Africa" and the foundation of the Congo Independent State by Leopold II, the real, though unforeseen, victor in these manoeuvres. In this study the author treats them in relation to general contemporary diplomacy, and to Anglo-German colonial rivalry in particular. The chief points emphasized are that the Conference was the result of a transitory Franco-German *entente*, brought about by German resentment over British handling of the Angra Pequena controversy: that during its course Bismarck veered from support of France to the side of Britain, an action which resulted in the settlement of the lower Niger question on terms very favourable to Britain; that contrary to widespread belief it was a diplomatic victory and not a defeat for this country; and that the whole incident caused unjustified ill-feeling in Germany.

It is not possible here to unravel in detail the tangled themes of this important chapter in modern history, beyond recording that the author presents her case very powerfully. The key to the whole development, and a point of much historical interest, was the attitude of Bismarck. As far as the actual issues of the Conference were concerned, Germany gained little that was ultimately to have concrete value, mainly, Miss Crowe believes, through ignorance of West African conditions, where German interests in reality were closer to those of Britain than of France. But from the standpoint of general policy he was satisfying his expansionists at home and embarrassing Britain in Egypt. On the other hand, Britain, apart from finally abandoning claims in the Congo basin, saw most of her views prevail at the Conference.

Miss Crowe has marshalled her facts clearly and writes spiritedly. If her book does not make easy reading, this arises from the complexity of the subject: it is difficult when reading the account of the Conference to keep in mind the relevant considerations set out in the opening chapters, and the subject is perhaps too wide to be adequately treated on this scale. One or two points call for notice. The statement that while the other governments were subscribing to the International African Association, Great Britain founded "instead the Royal Geographical Society in 1877, as an entirely independent body" results from a confusion of facts. Actually in that year the Society established the African Exploration Fund, which financed Keith Johnston and Joseph Thomson's expedition to East Africa. The author may have been confused by the fact that the African Association was merged in the Society in 1831. There is also some discrepancy between the area of the conventional Congo basin as shown on the sketch-map and its limits as described in the text. G. R. C.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

LAKE AND RASTALL'S TEXTBOOK OF GEOLOGY. Revised by R. H. RASTALL. Fifth Edition. *London: Edward Arnold*, 1942. 8½×5½ *inches; viii+462 pages; illustrations, sketch-maps, and diagrams.* 25*s*

'Lake and Rastall' has been a standard text-book since it was first published in 1910, and this new edition appears fourteen years after the fourth. The first half—physical geology—of the original work was by Lake, the second half by Rastall; now the whole has been revised and largely rewritten by the second author. In many ways it is almost a new book, for, in addition to the incorporation of new material summarizing recent researches some sections have been telescoped and others eliminated. The book is formal in its presentation of facts; it is cautious, perhaps unduly so, in the introduction of controversial matter and usually errs on the conservative side. Thus there is a certain impatience in the references to mechanical analysis of sediments (p. 161, "endless discussions "), there is no reference to the use of geomorphological methods in the interpretation of the Pliocene history of Britain and "the chapter on the Pleistocene has been kept as short as possible" and makes little attempt to summarize the present state of knowledge. On the other hand, the chapter entitled 'The New Red Sandstone" deals together with the Permian, Trias, and Rhaetic, following the position as it is in Britain rather than international usage. Various terms and phrases are introduced as if they were in current usage: "rudaceous rocks," "rank" of coal, the "Stretton line," which is not always the case. These are however but minor blemishes in a work which so well deserves its long sustained popularity. L. D. S.

ECONOMIC AND HISTORICAL GEOGRAPHY

DESCUBRIMIENTOS OCEANICOS: capitulos de historia de la marina de guerra de España. (In Spanish.) By JUAN OYARZABAL. *Mexico, D.F.: Editorial Séneca*, 1940. 9×6½ *inches; 574 pages.* 16*s* 6*d*

This volume covers a good deal of ground, for the author relates not only a part of Spanish military and naval effort in the early thirteenth century (dating the creation of the navy of the Kingdom of Aragon from 1229 and that of Castile from 1248), but follows the main paths of ocean discovery by Spaniards from the time of Columbus onwards until the opening years of the seventeenth century, when, with the voyages of Fernández de Quiros and of Váez de Torres, in the Pacific, "an epoch in the history of the Spanish navy can be considered as ended." Sr. Oyarzabal considers the taking of Tarifa from the Moors and the consequent mastership of Spain over the Mediterranean, as the starting-point of great Spanish sea adventures; and he makes the point that construction of the caravel made Atlantic voyages possible. It superseded older vessels, used for Mediterranean work, just as it was subsequently superseded by "los galeones, los navios y las fragatas que señalan una nueva época en la historia de navegación."

The four voyages of Columbus are traced in some detail, the author discussing from a scientific point of view the construction of the three vessels first used. The work of Pinzón and Ojeda, of Balboa, of Juan de la Cosa, and other early navigators, is related; the conquest of Mexico, the discovery of the Straits of Magellan, and the first Spanish crossings of the Pacific, form other chapters. An interesting section is devoted to the exploration of great American rivers by Spaniards; another outlines the expedition of Loaysa to the Moluccas in 1525. No new material is introduced, but the author has a good narrative style, clear

and picturesque, and has done useful work in bringing together for use in the Spanish-speaking world a considerable group of sea adventures. For the general reader the historical value of the work may be somewhat diminished by the absence of the author's critical faculty. The student, to whom the volume should appeal, will miss a number of needed helps to its use as a reference book: for there is no index, not even page headings; the pages are not documented; the brief bibliography contains a number of errors; and there are no maps.

L. E. J.

GENERAL

KIZZUWATNA AND THE PROBLEM OF HITTITE GEOGRAPHY.

By ALBRECHT GOETZE. Yale Oriental Series, Researches xxii. *New Haven: Yale University Press (Oxford University Press)*, 1940. xii+86 *pages;* 10×7 *inches.* 15*s* 6*d*

Shortly before the last war a series of excavations at the remote site, Bogaz-köy, near Sivas in central Turkey, were carried out for the German Oriental Society. Here they found the capital of that Hittite empire of the 2nd millennium B.C., whose destruction was so complete that almost every memory of it had till then been blotted out. Here they found the countless clay tablets of the Royal Archives and Library, heaped in the same ruin and confusion in which they were left when the city was sacked by an upheaval of barbarian peoples which reached as far as Egypt and involved the fall of Troy. As soon as the language of these tablets, written in cuneiform character but in an unknown tongue, could be read, it was clear that we should have an accession to our knowledge about the ancient world worthy to be set beside the Assyrian Royal Library at Nineveh, the palaces and tombs of Tiryns and Mycenae, and the Labyrinth at Knossos.

The Hittite language was duly worked out, and the publication of plain cuneiform texts followed. By 1939 some thirty-two volumes had appeared; certain of the most important texts, chiefly of historical interest, were transliterated and translated, but the majority are still accessible only to those who can read and understand the originals. Naturally Germany had a virtual monopoly of Hittitology by possessing the rights of publication of these finds; and Albrecht Goetze was one of her best Hittitologists. Being an early object of Nazi persecution, he migrated to America, and it is from there that this volume is published.

New discoveries are apt to raise as many difficulties as they solve, and the new subject of Hittite history soon reached a virtual *impasse* over basic questions of the geography of Anatolian places mentioned in the texts. The worst stumbling-block was the great state of *Kizzuwatna* and its city *Kummanni*. Winckler, Forrer, and Garstang contended that it lay about the later Comana Pontica on the Black Sea; Goetze, Sayce, and Sidney Smith placed it in Eastern Cilicia. But as few had access to the relevant original texts, the matter could not be settled.

In the present volume Goetze publishes (in several cases for the first time) all the relevant passages with translations, handling the intricate and technical arguments with his usual skill and fairness. It is now proved conclusively, I think, that *Kizzuwatna* is in Cilicia. Its population appears to have been partly *Luwian* (akin to Hittite), partly *Hurrian* (an ethnic group spread over south-east Anatolia and north Syria); and its gods are *Hurrian*. Indeed, it bordered on one side the state of *Hurri* from which the people took their name, and on the other, the sea. Its cities included *Tarsa* (Tarsus), *Ataniya* (Adana), *Lawazantiya*

(unlocated), *Kummanni*, otherwise called "the city Kizzuwatna" (Comana Cataoniae, on the Sarus river), and at one time *Urussa*—Urfa according to Goetze, but others believe it to be Rhosos, the modern Arsūz. In the sixteenth century B.C. *Kizzuwatna* was independent, under a "Great King" *Isputahsus*, who negotiates as an equal with the Hittite monarch *Telepinus*. When *Suppiluliumas* rebuilt the Hittite power in the fourteenth century he found *Kizzuwatna* barring his way to the south, and by some means brought it to submission. By a treaty with its king, *Sunassuras*, he restricted it to the area between *Lamiya* (the Lamos river), the High Mountain and *Saliya* (the Taurus at Bozanti), and the river *Samri* (the Saros now Seyhun), while *Kummanni* which commanded the main road was evidently made into a separate state, under *Suppiluliumas's* son *Telepinus* as its high priest. Not long after, *Kizzuwatna* ceases to be mentioned as a separate state, and was evidently annexed.

The suggestion is made that the name survived as Cappadocia (old Persian Katpatuka) with a different suffix. But this is a little strained. Surely the theory, I believe the late Professor Sayce's, that *Kizzuwatna* became the later *Cataonia*, strangely left unmentioned by Goetze, is more likely; indeed the present book proves it. R. D. B.

[ED.—*G.J.*] *Hittite names have been printed in italics and diacritical marks omitted.*

ISLANDS OF ADVENTURE. By KARL BAARSLAG. *London: Robert Hale*, 1941. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 312 *pages; illustrations and sketch-maps.* 15*s*

This is a description of calls made over a number of years at several islands well known by name to many people but by sight to comparatively few. The writer was a member of the crew of the yacht *Vagabondia*. He has taken considerable interest in his visits to these remote places and full advantage of the probably limited opportunities which his occupation would allow him, of landing and seeing for himself what life ashore was actually like. For this reason his observations are of value as they provide comparative pictures of isolated communities and varied conditions as remote from each other as Bahamas, Tierra del Fuego, and Mangareva. The history of each island is recorded and in many cases is a deplorable one, of misery and wickedness inflicted on peaceful and often primitive people by profit-seeking blackguard gangsters.

It would have been better to have limited this book to places actually visited, as it is the writer's personal observations which give colour to the stories he has collected and are a useful record. The tale of the *Dresden* hiding in Tierra del Fuego as told by Pagels the fisherman German Agent is all the more vivid when associated with the writer's own description of that desolate land. Islands as such have a subtle charm for us all, and Mr. Baarslag's stories help us to share his very obvious interest in visiting them as well as to envy him his opportunities of doing so. There are fifteen photographs, mostly poor and disappointing, and a number of small sketch-maps. R. H.

THE MONTHLY RECORD

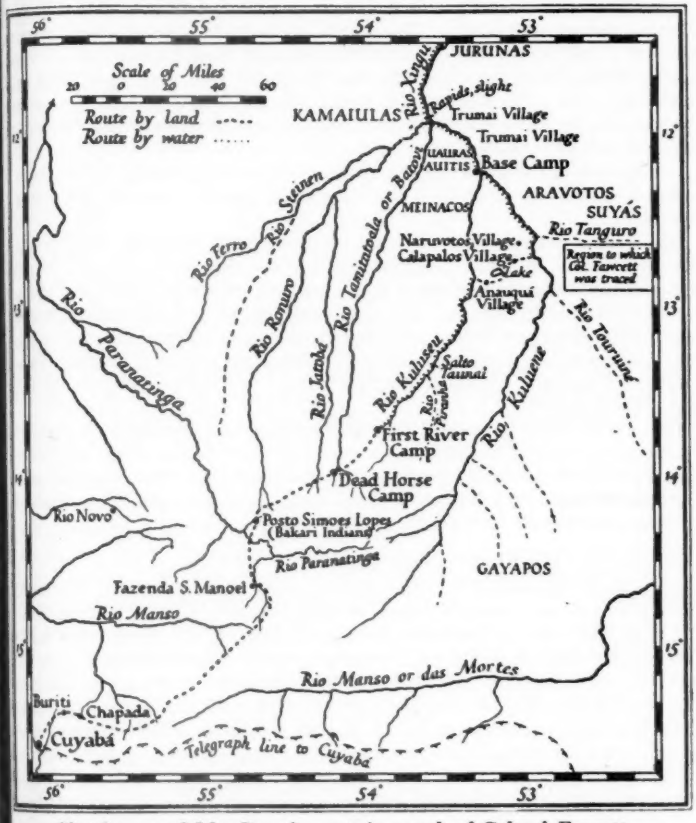
THE FATE OF COLONEL FAWCETT

The Times Literary Supplement of 1 August 1942 reviewed a book of missionary adventure: 'Pioneering for Christ in Xingu jungles,' by Martha L. Moennich, published this summer by the Zondervan Publishing House of Grand Rapids, Michigan. It corroborates in the main the conclusions of Commander Dyott and Mr. Vincenzo Petrullo, that Colonel Fawcett and his son were killed some five marches east of the Kuluene river, but gives a fuller and different account of the events which preceded the tragedy. We are fortunate therefore in being allowed to examine what is probably the only copy of the book in England, and to compare it in detail with what has been published in the *Journal* from time to time since 1928.

The author was one of a party of four, under the leadership of Mr. Halverson, who set out from Cuyaba in 1937 to establish a new mission station on the Kuruzeu: called Kulisevu and later Kuluseu by Dyott. It will be convenient to use the Dyott spellings as on our later sketch-maps, *e.g. Geogr. J.* 73 (1929) 541, putting Miss Moennich's spelling in brackets where it differs. They made acquaintance first with the Anauquás (Nafuguas) and their chief Aloique (Aloike) whom Dyott suspected was the murderer. From them they heard of the Kurikuros, an important element in the story, not mentioned by Dyott or Petrullo, but apparently the Aruvudu in the captaincy of Cuycúru or Cuicuru of the Anauqua woman's tale related to Monseigneur Coutouron by Signor Virginio Pessione (*Geogr. J.* 88 (1936) 67); and the Kuikuru of Mr. Guiley, who had visited them with Mr. Halverson in 1934 (*Geogr. J.* 88, 69). These people live between the Kuluseu and the Kuluene some way above the junction. So early as 1926 Mr. Halverson on his first journey to the Xingu region had met a Kurikuro canoe carrying a woman with a fair-skinned infant. Pessione relates that the Indian woman above had told how the son of the man with a long white beard was married to the daughter of a chief of the Aruvudus. Mr. Halverson and Mr. Guiley saw the boy again in 1934; the latter describes him as decidedly white, with light hair and blue eyes, and says that there had also been a girl child who died. In 1937 the four missionaries visited the Kurikuros village and saw the white boy, Dulipe, whom they describe as with red hair and blue eyes, but with short sight and oblique vision, rather suggesting albinism. A man Tuvi said the boy was the son of Jack Fawcett, who had with his father lived for a year with them. Miss Moennich accepts this version of Dulipe's parentage. One must however remember that Dyott says some of the Anauquás were a very pale shade of brown, and that many of the Wicurus had very light skins, sufficiently light to give rise to some of the stories Fawcett related about white Indians in these parts. The Fawcetts could hardly have reached the Kurikuros until July 1925 at earliest, and lived with them, presumably detained by them, for a year or more (Pessione, Halverson). One would like to know the month of 1926 when Halverson met the Kurikuro canoe carrying a woman with a fair infant.

Miss Moennich relates that towards the end of their stay in the Xingu three Wauras, presumably the Uauras shown on Dyott's map just above the junction of the Kuluseu and the Kuluene, had visited the camp, at a place unspecified, and said that the Kalapalos had killed *three* white men; that the Fawcett party had lived with the Kurikuros for a year; that Rimell had died; that Fawcett and his son had then gone on to the Kalapalos, who tried to dissuade them from continuing east, owing to want of supplies and water, and danger from the

Cayapos; that Fawcett had persuaded eight Kalapalos to go with him; that four days east of the Kuluene food had run out, but that Fawcett and his son insisted on going forward; that three of the Kalapalos had followed them, and shot them with arrows from behind. But Rimell was already dead. The third man killed by the Kalapalos, according to the Uauras, was perhaps de Winton Jones (see Guiley's report, *Geogr. J.* 88, 71), who, according to the Kamauras



Sketch-map of Mr. Dyott's route in search of Colonel Fawcett

Moennich, pp. 104, 109), had died with them after being poisoned by the Kalapalos.

With conflicting details, this story confirms what had been ascertained by Dyott and Petrullo, that Fawcett and his son died four or five marches east of the Kuluene. Dyott suspected that Aloique of the Anauquás had a hand in it, but blamed the Suyas. Petrullo gave us a photograph of two Kalapalos who had ferried Fawcett across the Kuluene (*Geogr. J.* 80, 151). Miss Moennich thinks it impossible that Aloique was involved, and accepts the Uauru account of the affair, but suggests that the Kalapalos killed them mercifully lest worse befall them.

EARLY HISTORY OF WATER-SUPPLY

We have received from Mr. R. C. S. Walters the following note on Mr. Bromehead's paper "Early history of water-supply" (*Geogr. J.* 99 (1942) 142, 183): Mr. Bromehead has written a most interesting paper, and there is only one statement from which I dissent: that the folklore attached to holy wells is interesting but not part of the history of water-supply. In a current engineering journal there is an advertisement for machinery for the old holy well of Horsted Keynes, Sussex; and surely, "The people of Shaftesbury should come down to Enmore Green at 1 o'clock in the afternoon and should dance for one whole hour, and the mayor must give the Queen's bailiff a 1*d.* loaf, a gallon of ale, a calf's head, and a pair of gloves; in default the bailiff and his men were to stop the water of the wells of Enmore from the Borough of Shaftesbury," is folklore which is part of the history of water-supply.

An interesting early reference to Hero of Alexandria, most of whose works I have translated into English, is that he warned people to avoid "sulphurous" waters.

The earliest record I have of measuring underground water intelligently is that of the Rev. W. Bland, of Hartlip, in Kent. Between 1819 and 1831 he determined the direction of the flow of underground water in that part of Kent in which he lived by calculating the levels referred to Ordnance datum in many wells. This was done many years before the great pioneer of underground water contours, Joseph Lucas, wrote his important papers ("Hydrogeological survey of England," *Nature* 18 (1878) and many in the *Proceedings of the Institute of Civil Engineers*).

One of the most interesting English historical supplies mentioned by Mr. Bromehead is that of Canterbury dating from 1167, where water was brought from a source about a mile outside the city in leaden pipes. Two twelfth-century Norman drawings of these water works are preserved in the Great Psalter in the library of Trinity College, Cambridge.

MEMORIAL TO BRIGADIER-GENERAL BRUCE

An airgraph received by a Fellow of the Society from his son, who is stationed in the North-West Frontier Province of India, gives particulars of the dedication of a memorial brass to Brigadier-General the Hon. C. G. Bruce in St. Luke's Church, Abbottabad, on July 5. The walls on either side of the church are filled with tablets to the memory of fallen officers of the 5th and 6th Gurkha Rifles. The new brass, placed in the centre of the north wall, is a simple rectangular plate erected by the officers of the two regiments in which General Bruce served, as a mark of their "respect for him as a soldier, admiration for him as a mountaineer, and affection for him as a man." It bears in the top corners the crossed kukhris of the respective regiments. The senior Gurkha officer present unveiled the memorial, Gurkha buglers outside the open doors played the Last Post, and the dedication was made by the Rev. H. M. Sanders, M.A.

ELECTIONS

The following have been elected Fellows of the Society:

On 17 August 1942: Capitaine Maurice Chambaudoin, F.N.F.L.; C. A. Franklyn, M.D., B.S., M.R.C.S., L.R.C.P., M.A., F.S.A. (Scot.); R. B. Goodchild; Lieut. F. A. de Vine Hunt, R.N.V.R.; Rev. Edward Jeffreys; Flight-Lieut. C. Spencer, R.A.F.V.R.